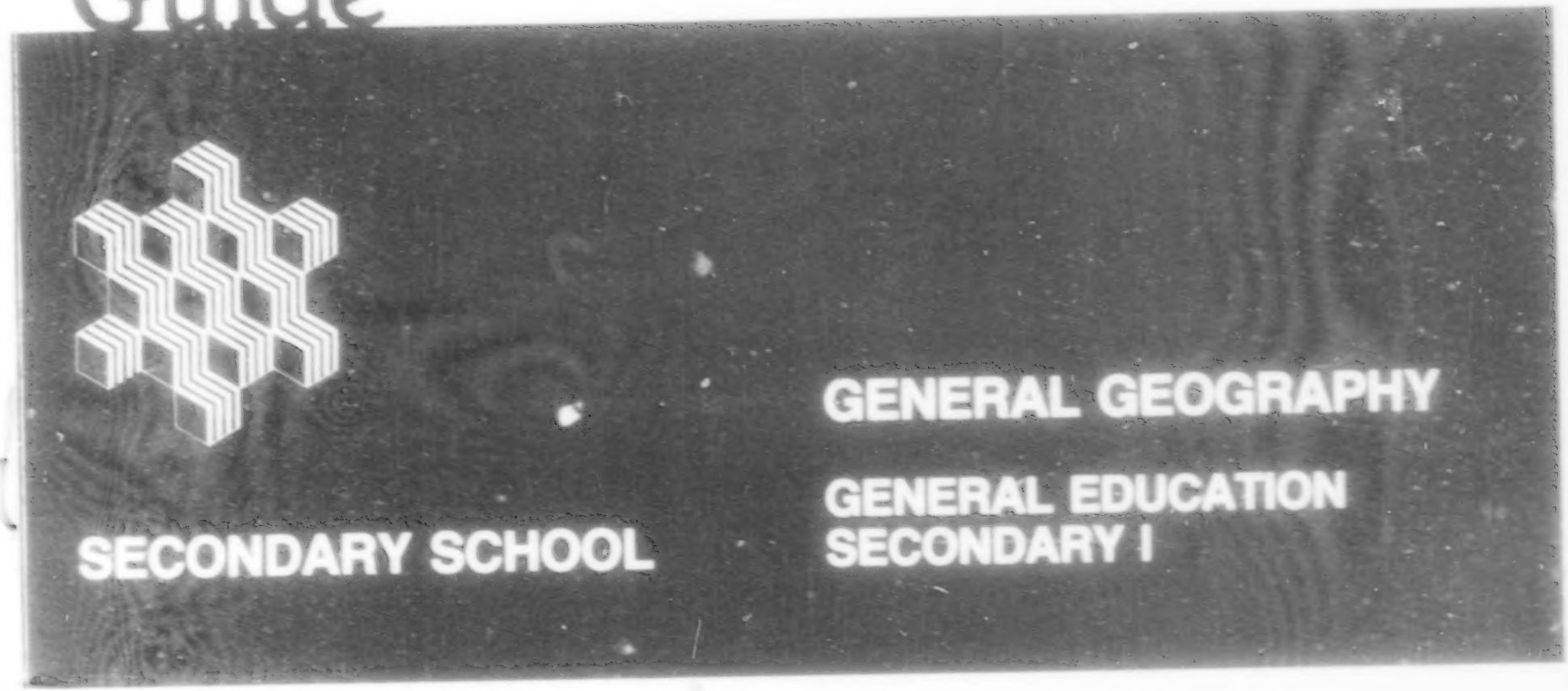
Curriculum Guide



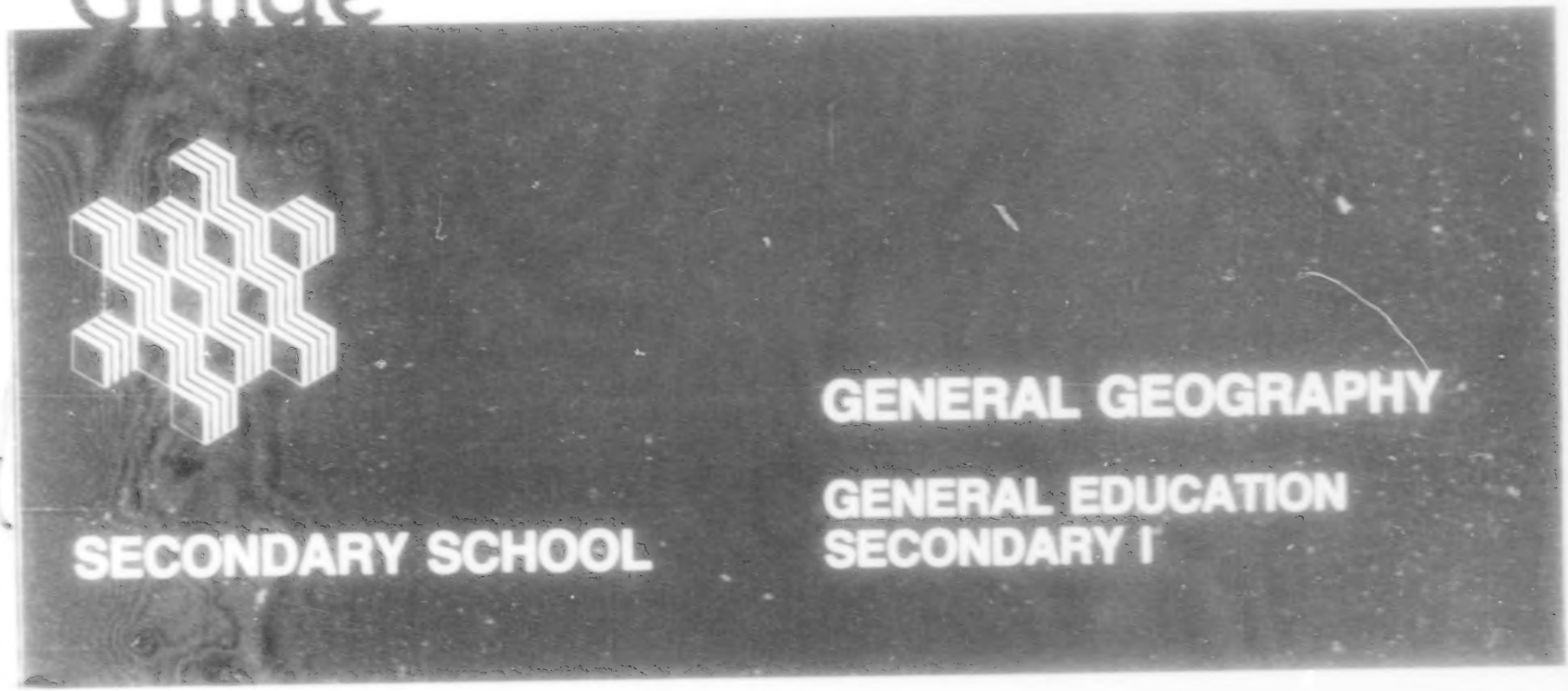
SECONDARY SCHOOL

GENERAL GEOGRAPHY

GENERAL EDUCATION
SECONDARY I

Québec

Curriculum Guide



Québec

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Le but général de ce guide pédagogique est d'aider les enseignants à mieux comprendre le contenu du cours, de proposer des approches pédagogiques, des situations éducatives et des activités d'apprentissage qui sont adaptées à une implantation fructueuse du cours. Le guide comprend cinq parties: 1. l'introduction; 2. les objectifs d'éducation; 3. l'enseignement des modules: cette section constitue le coeur même du guide; on y décrit, en détail, les objectifs du cours et l'on fait diverses suggestions en ce qui regarde les méthodes pédagogiques et les activités d'apprentissage. Le guide et le cours sont structurés de la même façon, organisés en modules et unités, avec les mêmes divisions et subdivisions. La quatrième partie donne des principes d'évaluation et la dernière partie présente une bibliographie sélective. Deux appendices complètent le document: 1. une carte topographique de la région de Beloeil avec un guide d'utilisation; 2. l'explication de l'élaboration du cours de géographie générale et du guide pédagogique.

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Curriculum Guide

SECONDARY SCHOOL

GENERAL GEOGRAPHY

GENERAL EDUCATION
SECONDARY I

Direction générale des programmes
Direction de la formation générale

Approved by the Comité protestant and
the Comité catholique of the Conseil supérieur
de l'éducation on August 26 and September 15 and 16, 1983.

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1. Introduction

INTRODUCTION

The production of better designed programs and courses for elementary and secondary schools, and the development of instructional aids for teachers, are two of the most notable measures taken by the ministère de l'Éducation to improve the quality of teaching in Québec. The curriculum guide provided by the Ministère for each new program or course has been designed for the same purpose.

This Curriculum Guide for the Secondary I *General Geography* course (Code 16-3657-01-A) is intended primarily as an instructional aid and also as a complement to the course. Unlike the course itself, this Guide is not compulsory. It is useful, however, because it makes the content of the course more explicit and provides helpful suggestion concerning instructional practices.

These suggestions, made by experienced geography teachers, are varied and practical. They are evidence of the invaluable contribution of practicing professionals to the preparation of this document.

With few previous models to follow, the Guide is evidently not perfect. It certainly has not drawn on all available resources and it covers only a number of the possible ways of teaching the course. At this point, the Guide represents only an initial interpretation of the course, and it will certainly have to be revised after a while. Teachers who think this Guide can be improved should send their comments and suggestions to the following address:

Responsable des programmes de
Sciences humaines au secondaire,
D.G.P.,
Édifice G, 9e étage,
1035, rue de la Chevrotière,
Québec, G1R 5A5.

2. Educational Foundations

2. ORIENTATIONS OF THE CURRICULUM GUIDE

2.1 Purpose of the Curriculum Guide

As stated in the *Cadre relatif à l'élaboration des programmes et des guides pédagogiques*, the general purpose of this Guide is:

> "... to help teachers understand the content of the course better, to suggest instructional approaches, educational situations, and learning activities which are considered suitable for an effective implementation of the course. The Guide is also intended to encourage creativity and innovation as regards instructional methodology."[1]

The goal of the Curriculum Guide is described in similar terms in *The Schools of Québec*.[2]

While the objectives of the course and their foundations are clearly stated in the course itself, the Guide provides the teacher with additional information for better understanding. In this way it complete the brief explanations given in the course as to the scope of each of the objectives.

In addition, specific instructional and learning activities are suggested for each objective. These activities are based on a variety of instructional approaches and methods, and are consistent with the orientations of the course. The teacher will have to *choose* among these activities those that are best suited to his own instructional practice.

Also to be found in the Guide is a list of the skills which are to be developed during instruction. There is in addition a list of instructional materials available on the market. In the fourth section various issues concerning educational evaluation are discussed.

In summary, the different suggestions made in the Guide are intented to help teachers have a better understanding of the scope of each objective as well as of the overall perspective of the course.

1. D.G.D.P., Ministère de l'Éducation, *Cadre relatif à l'élaboration des programmes et des guides pédagogiques* (Québec, 1978), P. 19. This citation is a free translation.
2. Ministère de l'Éducation, *The Schools of Québec: Policy Statement and Plan of Action* (Québec: Éditeur Officiel du Québec 1979).

2.2 Guiding Principles

Both the Curriculum Guide and the course are based on the same premises and reflect the same concerns. The instructional methodology suggested in the Guide is based on the following guiding principles:

2.2.1 *A Diversified Methodology*

There are many different educational trends in today's society, in Québec as in other parts of the world. This diversity is reflected in the Guide, in conformity with the actual practice of geography teachers who, on the whole, use a broad variety of instructional methods.

The discipline of geography can be taught in many different ways. Consequently a whole variety of instructional approaches are suggested in the Guide, along with a number of instructional and learning activities, and pertinent instructional materials.

These suggested approaches and activities which are applicable to the majority of pupils can be modified to suit the human and material resources available in the different schools of Québec. And since the Guide is basically optional, the teacher can adapt the suggested methodology to the requirements of his class. The Guide thus becomes a valuable source on which the teacher can draw to vary his teaching methods.

2.2.2 *An Instructional Approach Based on the Perspectives, Traditions, and Evolution of Geography*

The Curriculum Guide for General Geography takes the same general approach as the course. For example, several exercises on location of places and the distribution of various geographical phenomena have been included in the Guide with a view to highlighting the *spatial aspects* of the features under study. If the pupil is urged to use the scientific method to apprehend a particular spatial reality, it is in order to introduce him to the *relationships* that exist among the different elements and to make him aware of the *interdependence* of man and his environment. The methodology proposed in the Guide is also consistent with the tradition and evolution of geography teaching. The activities that are suggested relate variously to physical or human geography in general, or to regional geography.

Current trends in geography, particularly the environmental approach and the increasing transformation of the discipline into an applied science, have been given due consideration in the Guide. Consequently, several of the suggested instructional activities are designed to help the pupil acquire such technical skills as map reading and the collection and quantification of data. Other activities are intended to help the pupil think about certain spatial problems.

2.2.3 *An Active and Concrete Teaching and Learning Process Based on the Pupil's Everyday Experience*

Much emphasis is placed on the pupil's *motivation* as an indispensable precondition to the learning process. Thus, for most of the objectives, the learning situations that are suggested call for concrete activities which integrate the pupil's personal experience and take into account his immediate environment, all in order to arouse his interest. That is why the frequent use of certain geographical instruments, the map in particular, is recommended, and why the direct or indirect observation of the phenomena under study is encouraged.

The pupil's active *participation* in the learning process is also encouraged. As indicated throughout the Guide, the teacher's role is not that of a conveyor of knowledge, but, rather, that of a *guide* for the pupil who would himself discover whatever he is expected to know. There are numerous activities in the Guide that are intended to facilitate such discovery and to give the pupil the opportunity to apply his newly acquired knowledge. For instance, field trips and tours of industrial sites are excellent learning opportunities, since during such outings the pupil is encouraged to use the methods of geography. In view of the fact that field trips and visits are often difficult to organize, they are not overemphasized in the Guide. The teacher is encouraged to resort to them as often as possible, however, in order to add a touch of local color to the content of the course. As the pupil endeavours to understand the immediate environment through direct observation, he acquires and uses a store of knowledge which will facilitate his study of more distant areas.

2.2.4 *An Instructional Methodology Designed to Facilitate the Attainment of the Terminal and General Objectives of the Course*

The objectives of the course have been selected and organized hierarchically so as to give the pupil an overall view of the world.[1] The Curriculum Guide is consistent both with the orientation of the course and the goals of geography.

The Guide respects the structure of the course and suggests a teaching approach designed to facilitate the attainment of the general and terminal objectives. Thus, it is clearly acknowledged that these objectives are consonant with the basic concepts and skills which the pupil has to acquire in geography.

Since the secondary geographical concepts are covered at the level of the intermediate objectives, these objectives become necessary for the attainment of the terminal objective. That is why most of the teaching and learning activities that are suggested relate to the intermediate objectives and sometimes also to their related content.

It is worth pointing out, however, that the different intermediate objectives are of uneven importance as regards the attainment of a particular terminal objective. The teacher should, therefore, be selective with respect to the different activities suggested, giving his preference to those which are conducive to smooth and effective teaching and learning, and which at the same time facilitate the pupil's understanding of the unit and make it possible to cover the whole course.

---

1. This refers to the guiding principle 2.31. of the course, on page 16: "... It is important to give the pupil a general view of the world so as to enable him to understand how man has developed in his environment."

2.2.5 *Planning and Inventiveness as the Key to Effective Teaching*

The Curriculum Guide is no substitute for careful instructional planning, nor is it designed to provide ready-made solutions to the many problems the geography teacher is likely to encounter. The best teaching strategies and the most effective instructional methods and learning activities will undoubtedly be those that are thought out by the teacher himself. However, the suggestions made in the Guide as regards instructional methodology incorporate both current theoretical trends in geography teaching and the actual practices of geography teachers. Some teachers will find in these suggestions both a challenge to revolutionize their teaching and the means to carry out this renewal. Others may experience a surge of creativity and be inspired to explore new paths.

The Curriculum Guide being a flexible and versatile aid, the teacher should feel free to adapt its contents to suit his class and his particular milieu. He can modify the teaching and learning activities as he wishes and create new ones as local resources allow.

2.2.6 *Guidelines for Educational Evaluation*

The methodology suggested in the Guide is designed primarily to facilitate the attainment of the terminal objectives, hence the essential importance of these objectives in the evaluation of learning. The teacher should, therefore, give precedence to the terminal objectives for purposes of evaluation, and not overemphasize the elements of related content that have little importance in relation to the terminal objective. The measurement instruments for the program developed by the Ministère will be consistent with this provision.[1]

1. Direction de l'évaluation pédagogique, Direction générale du développement pédagogique, Ministère de l'Éducation du Québec.

2.3 Educational Values

The following citation is from the second chapter of *The Schools of Québec*, in which the final aims and objectives of formal education in Québec are discussed:

> "The emphasis placed on the respect for differences and on the necessary accomodation of diversity proceeds from a desire to delineate clearly an educational project for the schools of Québec. Through the agency of the ministère de l'Éducation, the Government wishes to define the values on which educational action must be based. These values are presented in the form of general goals and specific objectives. Each school must find its own point of departure, but it is by reference to these values, goals and objectives that it will progressively develop its educational project."[1]

The Guide also highlights a whole series of intellectual, moral, social, cultural, affective, and esthetic values which are considered the most essential for the development of a balanced, well-rounded personality. It is these and other values which form the foundation of school education and which, consequently, underlie the content of all courses and programs of studies. Thus, in both the *General Geography* course and the Curriculum Guide, the orientations and the learning objectives in particular reflect a broad variety of these educational values.

Since the process by which educational values are internalized is highly complex and personal, and since the teacher alone determines how to use the course description for instructional purposes, ultimately it is his responsibility to identify and to select the educational values that are most appropriate to his particular school environment and the aspirations of his pupils.

1. Ministère de l'Éducation du Québec, *The Schools of Québec: Policy Statement and Plan of Action* (Québec: Éditeur Officiel du Québec, 1979), p.26.

3. Teaching the Modules

3. TEACHING THE MODULES

3.1 Description of the Modules and Units

This section, which is the longest segment of the Curriculum Guide, constitutes the very heart of this document. Here, still with the aim of improving the teacher's effectiveness, the learning objectives of the course are once again described, but in greater detail this time, and various suggestions are made concerning instructional methods and activities. Both the Guide and the course are structured in the same fashion, both being organized into modules and units, with the same divisions and subdivisions.

3.1.1 *Modules*

The module, the basic division of the course, is organized around a general objective. It encompasses, therefore, a whole sequence of items of related content gathered around a central theme which corresponds to its title. In each module covered in the Curriculum Guide, the statement of the general objective and the description of the corresponding terminal objectives are presented first. They are followed by a number of suggestions as to how the teacher might handle the content of the module. These suggestions come under the heading *How to Teach the Module*. In addition, under this same heading, a precise description is given of the different links between the terminal objectives within the module, and between the different modules. Finally, a number of recommendations regarding instructional methods and activities are made in this part of the Guide.

3.1.2 *Units*

The module is subdivided into units. In each unit, the terminal objective and corresponding intermediate objectives are presented first. Next, under the heading *How to Teach the Unit*, comes a precise description of the meaning and orientation of the terminal objective. Since the teaching of the course is based on the terminal objectives, the Guide explains how these objectives can be attained by means of the intermediate objectives. As a reminder that the instructional focus is the unit, the page in which the structure of the content of the course was described has been reproduced in the Guide.

Finally, following a description of the overall methodology recommended for the unit, the Guide explains how the teacher might handle the intermediate objectives, either individually or in groups. Additional detail about their respective content is also provided, and various teaching and learning activities are suggested. The teacher will find in these activities different ways and means of guiding the pupil's learning. While most of them are at the core of the learning plan, others are included for enrichment purposes. The activities belonging in this last group are identified by a *black dot*. It is worth pointing out that *all the activities described in the Guide are simply being suggested and ultimately are optional. The teacher should feel free to use only those that suit him in planning his classes.* And since the suggested activities cannot possibly be said to be equally relevant to every single geography class in Québec, the teacher will have to adapt them to local conditions and to use them selectively for more effective results.

3.2 Instructional Materials

Instructional materials are designed to facilitate the teacher's task, by giving him what he needs to improve the pupil's understanding of the content of the course. In geography teaching, pertinent and well-conceived instructional materials, both from the point of view of teaching methodology and of the discipline itself, can be advantageously integrated either as a basis for a particular lesson or as a complement to it.

The *Selected Bibliography*, which appears in Part 5 of the Guide (p. 223), is intended to help the teacher find relevant materials for the various objectives of the General Geography course. The suggested teaching materials and reference titles included in the bibliography are grouped under these two headings: "Printed Materials" and "Audiovisual Materials."

3.3 Skills to Develop During Instruction

The methodology discussed throughout the Guide is designed not only to enable the pupil to build a store of knowledge, but also to develop a number of skills pertaining to the techniques and method used in geography. These skills are highlighted in the relatively exhaustive list which follows. It should be understood, however, that the different schools can accomplish much more than is suggested in this particular list. It should also be pointed out that the list should not be considered restrictive in terms of the focus of evaluation of learning, since the pupil will only be introduced to several of these skills and will necessarily have to work on mastering them later.

3.3.1 *Skills Pertaining to the Techniques Used in Geography*

- Setting a plan, map, etc;
- Finding a location on a plan, map, globe, etc.;
- Making use of certain techniques for representing the environment;
- Making use of certain measurement techniques;
- Tracing a route on a map;
- Making use of geographical tools and documents;
- Making a diagram, a sketch, a plan, a topographical cross-section, a map, a model, etc.

3.3.2 *Skills Pertaining to the Method Used in Geography*

- Observing geographical features directly or indirectly;
- Seeking out information related to the content of the modules;
- Defining terms;
- Listing or categorizing (etc.) physical and human geographical features;
- Describing and transposing geographical information;
- Comparing, differentiating, and relating (etc.) different elements of the physical or human environment;
- Formulating hypotheses;
- Checking the accuracy of data and results;
- Making deductions, evaluating, and interpreting in order to reach simple conclusions;
- Applying principles in order to solve simple problems;
- Reading, discussing, and explaining something orally or in writing.
- Etc.

3.4 How to Teach the Modules

The following description of the five modules of the course includes a number of *suggestions concerning instructional methods and activities* which are conceived in terms of the objectives of the course. The teacher *is free to use them as he sees fit for his lesson plans*. It is understood that he will select only those teaching and learning activities which he considers most appropriate to the needs of his pupils.

TABLE – MODULES AND UNITS OF THE GENERAL GEOGRAPHY COURSE

MODULES		UNITS		
Titles	**General Objectives**	**Terminal Objectives**	**Number of Objectives**	
			Compulsory	***Optional**
1 Planet Earth	To understand that geography is the study of the planet Earth.	1.1 To identify the characteristics of the study of Geography. 1.2 To describe the Earth by locating it in the Universe and stating its principal characteristics. 1.3 To distinguish between the movements of the Earth and to explain their consequences.	3	
2 The Globe, the Map of the World, and the Atlas	To be able to locate geographical features on the globe, on the map of the world, and in an atlas.	2.1 To use geographical coordinates to locate features on the globe. 2.2 To use the globe, the map of the world, and an atlas.	2	
3 Topographic Maps, Road Maps, and City Plans	To be able to use topographic maps, road maps, and city plans.	3.1 To determine directions using different methods. 3.2 To use the principal components of maps. 3.3 To read the ways in which relief is shown on topographic maps. 3.4 To use maps of various types.	4	
4 Elements of Physical Geography	To understand the principal elements of the natural environment	4.1 To describe the processes by which relief is formed. *4.2 To describe the processes which change relief. 4.3 To establish the links between climate and vegetation. 4.4 To show the importance of water on the Earth.	3	1
5 Elements of Human Geography	To understand the principal elements of the human environment.	5.1 To determine some factors which characterize the world's population. 5.2 To distinguish among different types of settlement. 5.3 To establish the relationships between the physical and the human aspects of an environment.	3	

* Objectives marked with an asterisk are optional.

Module 1

PLANET EARTH

MODULE 1

CONTENTS

General Objective, Terminal Objectives, and Methodology	page 19
Unit 1.1	page 21
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Instructional Materials	page 223

INSTRUCTIONAL MATERIALS

Map of the neighborhood or of the locality
Globe
Planetarium
Pictures or models representing: the Universe, our galaxy, the solar system, the Moon.

SUGGESTED AMOUNT OF TIME: About 10%

MODULE 1

PLANET EARTH

GENERAL OBJECTIVES: **UPON COMPLETION OF THIS MODULE, THE PUPIL SHOULD UNDERSTAND THAT GEOGRAPHY IS THE STUDY OF PLANET EARTH.**

Terminal Objectives:

1.1 To identify the characteristics of the study of Geography.

1.2 To describe the Earth by locating it in the Universe and stating its principal characteristics.

1.3 To distinguish between the movements of the Earth and to explain their consequences.

OVERVIEW OF MODULE 1

In the elementary school Social Studies Program the pupil studies geography in tandem with history and economics. In secondary school the pupil studies these three disciplines in a more formal way, and is introduced to general geography in Secondary I. It is logical that the pupil's introduction to the field of geography should begin with a definition of its subjects, methods, and usefulness. In this first module, then, the pupil finds out what he will be learning in geography as well as why and how he should study this discipline. It seems important that at the beginning of the year the pupil should have some idea of what to expect in a geography course.

At this point, in view of the pupil's age, instruction should not be too advanced or theoretical. It is more important to stimulate general interest and to motivate the pupil by using a concrete approach and "attention-getting" methods and activities. Field trips and educational outings, for instance, give the pupil repeated opportunities to study geography "*in the field*" and to develop his understanding of the nature of the discipline.

In Units 1.2 and 1.3 the pupil begins his study of the planet by observing it in space instead of focusing on a more immediate reality, such as the locality. The teacher does not have to follow this particular approach, however, and should feel free to teach these two units any time he wishes during the year. The authors of the course have decided to place the study of Earth as a planet at the beginning of the year mainly because this is the practice of many geography teachers. In addition, given the interest most pupils have in space phenomena, this is also a way of ensuring their motivation from the start.

Various concepts and facts used in other sciences, such as astronomy and cosmology, are dealt with in these two units. Consequently the teacher should keep his explanations simple and comprehensible to the pupil. Despite the pupil's interest in this area, the focus of instruction in these two units should be the description of the Earth and its different movements and their consequences for the planet.

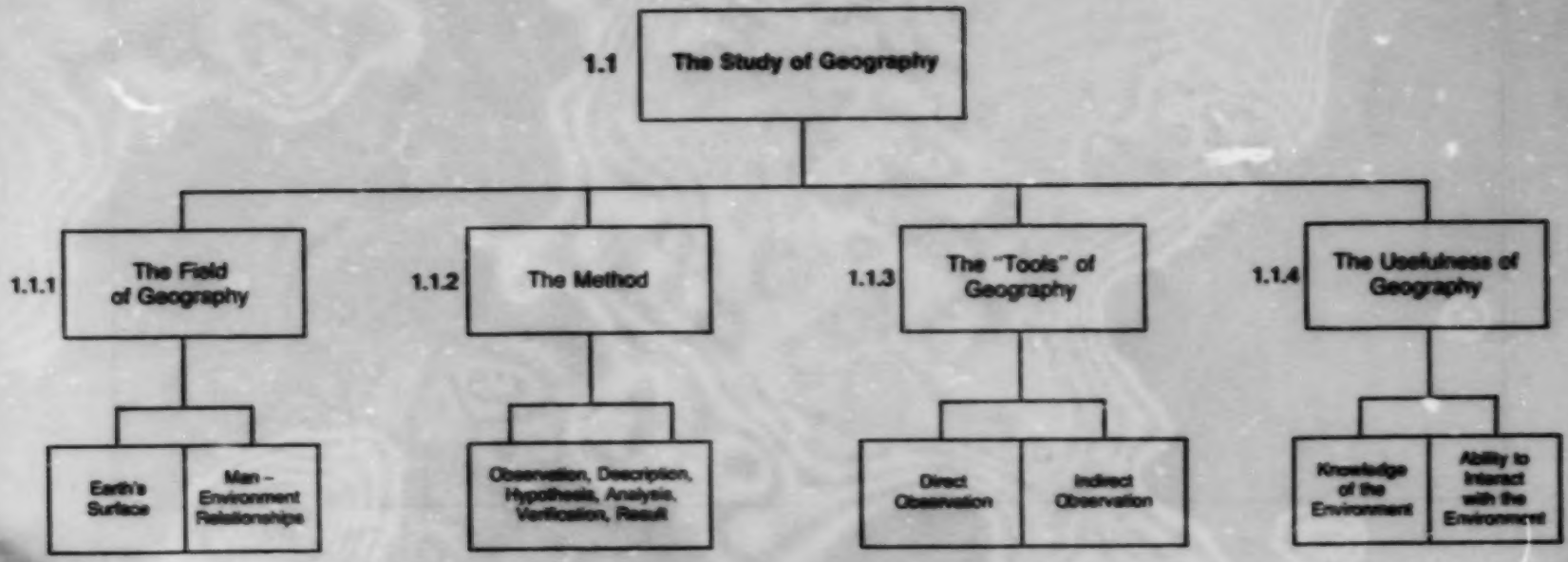
UNIT 1.1

Terminal Objective **1.1 To identify the characteristics of the study of Geography.**

Intermediate Objectives:

1.1.1 To define the field of Geography.
1.1.2 To identify the principal elements of the method used in Geography.
1.1.3 To distinguish among the principal "tools" used by geographers.
1.1.4 To discuss the usefulness of Geography.

ORGANIZATION OF THE CONTENT



HOW TO TEACH UNIT 1.1

In view of its theoretical aspect this unit calls for very concrete instructional methods and activities. The objective is to adjust the content of the unit to the pupil's level of comprehension and to stimulate his interest at the beginning of the course. The study of this unit will be made easier if the pupil's personal experience and his knowledge of his environment are taken into account.

In this respect, as a teaching strategy, a field trip is recommended. Its purpose would be to synthesize the content of the first terminal objective, by *grouping* the intermediate objectives of the unit. This simple and easy process of integrating the different concepts under study will enable the teacher to reduce considerably the amount of time devoted to this unit. Even if actual instruction begins at this point, the teacher should be aware that it is only by the end of the course that the pupil will have a better understanding of geography.

It remains essential that the pupil be introduced to the rudiments of the discipline from the start. Thus, should it be impossible to organize an introductory field trip, other practical and motivating means should be found to make the content of the unit more appealing to the pupil, and, consequently, to facilitate attainment of the first terminal objective.

UNIT 1.1	**Terminal Objective: 1.1 To identify the characteristics of the study of Geography.**	
	Intermediate Objectives: 1.1.1 To define the field of Geography. **1.1.2 To identify the principal elements of the method used in Geography.** **1.1.3 To distinguish among the principal "tools" used by geographers.** **1.1.4 To discuss the usefulness of Geography.**	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
The field of geography	**Objective 1.1.1** Geography is the study of the Earth as Man's environment. It involves locating places and features and explaining the organization of the landscapes of the Earth, and is concerned with the interdependence of the physical and man-made features of the planet. In view of the particular instructional approach adopted here, this objective will be dealt with only at point 6 of the teaching strategy. In any case, it cannot be achieved until the end of the course.	Suggested teaching strategy: *Field work in the immediate neighborhood of the school.* In the classroom the teacher should: 1. Explain the purpose of the field work: to find out what geography is and to discover the method and tools of the discipline as well as its usefulness. 2. Provide the pupil with a map of the neighborhood and describe the different activities to be carried out in the field. In the field the pupil should: 2.1 Set his map. 2.2 Locate the major man-made features (school, buildings, streets, etc.) and physical features (relief, vegetation, etc.) of the landscape. 2.3 Measure the school grounds. 2.4 Draw a sketch of the landscape around the school.

Content	Details on the Content	Suggested Teaching/Learning Activities
The method of geography	**Objective 1.1.3** The method used in geography to explain the interrelationships of the physical and man-made features of the landscape comprises the following steps: – Observation of a geographical feature and collection of data which will subsequently be processed in the form of a descriptive text or a map; – Formulation of an hypothesis to explain the cause of the phenomenon observed; – Analysis of the facts and testing of the hypothesis through experimentation; – Results obtained through confirmation or invalidation of the original hypothesis; – Formulation of generalizations, if applicable to other situations. The teaching and learning activities suggested at point 3 are designed to familiarize the pupil with this process.	3. Back in the classroom the pupil should process the information collected during the field work. He should: 3.1 Evaluate the information and make the necessary adjustments. 3.2 Formulate an hypothesis such as: The school's site may or may not be the most suitable site possible. 3.3 Take the necessary steps to prove or disprove this hypothesis: – Based on the criterion of accessibility. 3.3.1 Locate on a city plan the home addresses of a number of pupils. 3.3.2 Estimate the distance between the school and these pupil's homes. 3.3.3 Identify the different routes to the school. 3.3.4 Evaluate whether or not the school's site is advantageous in terms of accessibility. – Based on the criterion of the *quality of the human environment.* 3.3.5 Identify the nature of the neighborhood: residential, industrial, etc. 3.3.6 Identify available services: recreational, cultural, social, etc. 3.3.7 Identify certain pollution problems: air, noise, water, etc. 3.3.8 Evaluate whether or not the school's site is advantageous in terms of the quality of the human environment. – Based on the criterion of the *quality of the physical environment.* 3.3.9 Evaluate the amount of space available for the school and identify various signs indicative of the quality of the physical environment. 3.3.10 Find out if there are any green spaces near the school. 3.3.11 Evaluate whether or not the school's site is advantageous in terms of the quality of the physical environment.

Content	Details on the Content	Suggested Teaching/Learning Activities
		3.4 Other hypotheses could be formulated. Example: "School bus routes are planned in terms of the spatial distribution of pupils."
The "tools" of geography	The objective here is to identify the "tools" used for direct and indirect observation. Some of these tools, such as the globe and maps, will be studied in Modules 2 and 3. Others, such as the compass, meteorological instruments, graphic tools, etc, will be used throughout the year.	4. Have the pupil make a list of the different "tools" used during the field work. 4.1 List other "tools" used in geography. 4.2 Classify the "tools" on the basis of their use either for direct observation or for indirect observation.
The usefulness of geography	The usefulness of geography should be discussed with a view to highlighting the pertinent contribution of the discipline. Geography makes a valuable contribution to the cultural development of the individual. In addition to shaping his intellectual faculties, the discipline provides him with a store of knowledge that is quite useful in everyday life. The science of geography contributes to the organization of the environment and the development of the economy in general. Its all-embracing approach to reality is particularly effective for solving complex problems. Finally, more than any other science, geography provides a foundation for internationalism and encourages the development of human solidarity by gradually fostering knowledge of the world.	5. Help the pupil to discover the usefulness of geography. 5.1 Discuss, ask pertinent questions, etc., in order to show that a knowledge of geography is useful for organizing space and solving many problems. Examples: city planning, construction of hydroelectric dams, floods, etc. 5.2 Identify in his region examples of organization of the landscape which required a knowledge of geography. 5.3 Show in what ways geography can be useful in the area of recreation. 6. Help the pupil to define what geography is all about. 6.1 By asking pertinent questions, highlight the concepts of location and spatial organization used during the field trip. 6.2 Identify a number of activities associated with particular organized spaces which were observed during the field trip. 6.3 Identify the physical and human features of the environment observed. 6.4 Define geography.

Content	Details on the Content	Suggested Teaching/Learning Activities
	If it is not possible to organize a field trip to enable the pupil to discover geography, the teacher might want to use various graphic representations of the neighborhood and pursue the proposed activities by indirect observation.	7. Organize a synthesizing activity in order to check that the pupil understands what geography is about and can identify the characteristics of its study. (Terminal Objective 1.1) 7.1 Illustrate the basic concepts of geography. 7.2 Complete a paragraph that begins with the sentence: "If I were a geographer. . ." 7.3 Imagine a problem related to spatial organization and show how a knowledge of geography can help to solve it. 8. Carry out the activities suggested at points 2, 3, and 5, using a land use map, plan, or aerial photograph of the neighborhood. 9. Apply the same teaching strategy to the study of other geographical phenomena. Examples: location of an industrial plant, a ski resort, or a recreational park; harnessing of a river, installation of an outdoor recreational center, etc. 10. Other suggestions: use slides and other pertinent visual aids to illustrate the characteristics of the study of geography. (Terminal Objective 1.1).

UNIT 1.2

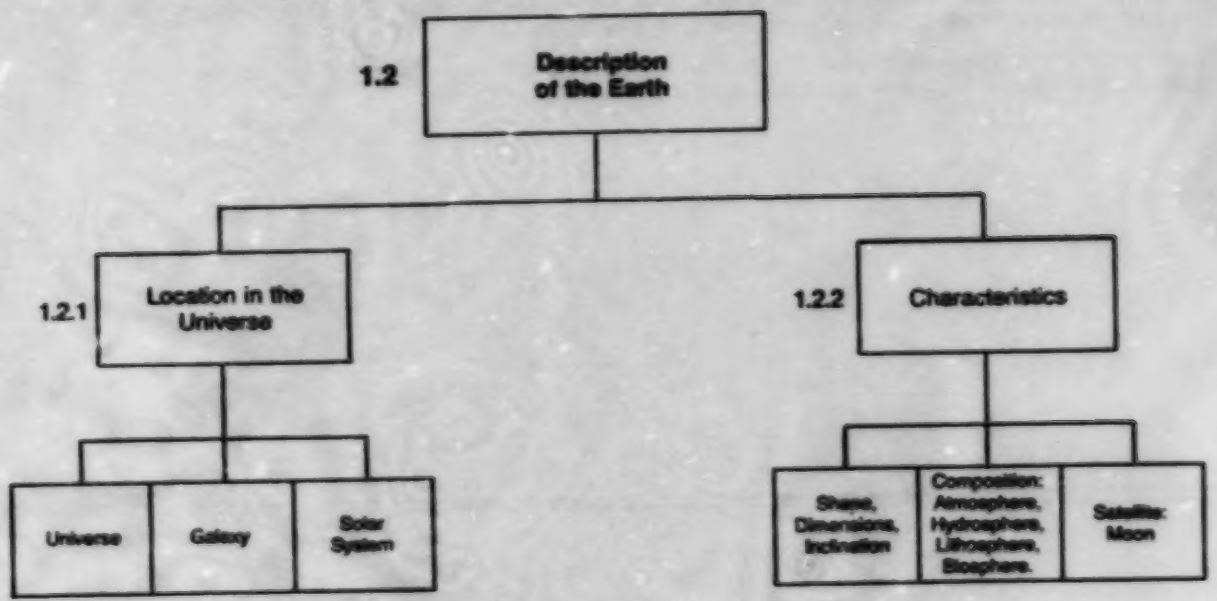
Terminal Objective

1.2 To describe the Earth by locating it in the Universe and stating its principal characteristics.

Intermediate Objectives:

1.2.1 To locate the position of the Earth in the Universe.
1.2.2 To give the main characteristics of the Earth.

ORGANIZATION OF THE CONTENT



HOW TO TEACH UNIT 1.2

This unit, whose focus is the place of the Earth in the Universe, contains a number of concepts and facts which are studied in depth in other disciplines. At this point, the pupil is expected only to be able to use these concepts, which are highlighted in the terminal objective, for the purpose of describing the place of our planet in the Universe.

The pupil has to grasp the meaning of the word "Universe" before being able to understand that the Earth is only one of countless other elements in this immensity. Once the pupil understands this he should be able to determine the place of the Earth in the Solar System, which is relatively easier to do.

Whereas the first intermediate objective gives the pupil an opportunity to "survey" the Universe as it were, the next objective requires him to describe the Earth and to highlight the particular features that distinguish it from the other planets. It is important to emphasize some of the properties that make the Earth a suitable environment for the development of life. This is a good opportunity to encourage the pupil to think about the importance of protecting the vital resources of the planet (water, soil, air, etc.)

While this unit is likely to arouse the pupil's interest because its "science-fiction" aspect appeals to his imagination, the teacher should be careful not to discuss concepts, ideas, and facts that are beyond the grasp of children in this age group. Consequently, his vocabulary should be comprehensible to the pupil. He might also find it worthwhile to use a variety of audiovisual materials on the subject to complement his instruction.

As pointed out in the course description, the teacher is not obligated to cover this unit and the next (Unit 1.3) at the very beginning of the course. They may also be studied in the last part of the year.

UNIT 1.2	**Terminal Objectives: 1.2 To describe the Earth by locating it in the Universe and stating its principal characteristics.**	
	Intermediate Objectives: 1.2.1 To locate the position of the Earth in the Universe.	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
Universe Galaxy Solar System Star Sun Planet Earth	Geography borrows a number of concepts from astronomy and cosmology. The pupil is probably already acquainted with some of the terms used at this point as he may have been exposed to them through science-fiction. However, he is not expected to be thoroughly familiar with them all but, rather, to have a sufficient understanding of them to be able to use them in locating the position of the Earth in the Universe. To be able to locate the Earth, a certain understanding of the order of magnitude of the Universe is required. Distances cannot actually be measured on this scale. While it is true that the distances between the earth and other bodies in the Solar System have been calculated scientifically, it would be preferable to use a simpler system of reference, such as the table presented in the Curriculum Guide. (See Table 1, p. 30).	1. Help the pupil develop a mental picture of the Universe while learning an appropriate terminology. 1.1 Highlight a number of terms pertinent to this subject, using television broadcasts, films, slides, transparencies, photographs, etc. 1.2 Choose from the terms highlighted earlier those that could designate elements of the Universe. 1.3 Find the definition of these terms. 1.4 Arrange the following terms in order of size: planet, galaxy, solar system, universe, star. 1.5 Illustrate the order of magnitude involved in the above sequence. 2. Help the pupil discover the position of the Earth in the Universe. 2.1 Simulate a journey from our galaxy to another, using a variety of visual aids. Example: Give a group of Extraterrestrials the appropriate directions that would enable them to reach the Earth: shape of our galaxy, location of the Solar System, position of the Earth. 2.2 Draw a sketch of the Solar System. 2.3 Reproduce the scale of the Solar System. Example: Indicate on a strip of paper the respective position of the different planets and their distance from the Sun. (See Table 1). 2.4 Describe and discuss the relative position of the Earth in the Solar System, using a planetarium as a visual aid.

TABLE 1[1]

THE SOLAR SYSTEM							
Object	Distance from Sun (Millions of Km)	Distance from Earth	Period of Revolution	Period of Rotation	Diameter at Equator (Kilometers)	Mass (Earth = 1)	Number of Satellites
Mercury	58	80-218	88 days	58,7 days	5 000	0,055	–
Venus	108	42-256	225 days	243 d. (retro.)	12 400	0,815	–
Earth	150	–	365 days	23 h 56 m. 1	12 757	1,000	1
Mars	228	56-400	687 days	24 h 37 m. 4	6 800	0,107	2
Jupiter	779	589-960	12 years	9 h 50 m. 5	142 900	318,0	12
Saturn	1 428	1 254-1 645	29,5 years	10 h 14 m.	120 900	95,2	15[2]
Uranus	2 872	2 570-3 133	84 years	10 h 49 m.	50 000	14,6	5
Neptune	4 501	4 278-4 656	165 years	16 hours	43 000	17,3	2
Pluto	5 906	4 250 7 475	248 years	6,4 days	5 260	0,11	–
Sun	–	146,1-151	–	25-35 days	1 382 400	333 000,0	–
MOON	149	355 200-404 800 km	27 d. 7 h 7	27 d. 7 h 7	3 456	0,012	–

1 Adapted from Miriam S. Burlan, *The Solar System* (Ottawa: Federal Observatory and Department of Energy, Mines and Resources, 1967) and from J.H. Jackson and E.D. Evans, *Spaceship Earth - Earth Science* (Boston: Houghton Mifflin Co., 1970).

2 Data provided by *Voyager 1*, 1980.

UNIT 1.2	**Terminal Objective: 1.2 To describe the Earth by locating it in the Universe and stating its principal characteristics.**	
	Intermediate Objectives: 1.2.2 To give the main characteristics of the Earth.	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
Spherical shape	The main characteristics of the Earth are: its spherical shape, its tilted axis, and its composition.	1. Make the pupil aware of the spherical shape of the Earth. 1.1 Highlight the characteristics of the Earth, using such visual aids as the globe, space photographs of the Earth, etc. 1.2 Look for proof of the spherical shape of the Earth. Examples: possibility of going around the Earth, lunar eclipse, the horizon, scientific data, etc. 1.3 Simulate a lunar eclipse and an Earth eclipse in the classroom, using spheres of different dimensions and a spotlight.
Size	The size of the Earth should be discussed by comparing it with the other planets rather than in absolute numerical terms.	2. Have the pupil investigate the size of the Earth. 2.1 Compare the Earth to the other planets. 2.2 Draw a sketch of the different planets of the Solar System, using pertinent data and the appropriate scale. • 2.3 Highlight the know characteristics of each planet.
Tilted axis	Here it is sufficient to point out to the pupil that the axis of the Earth is tilted in relation to the orbit of the planet. The consequences of this tilt will be studied in depth in Objective 1.3.2.	3. Have the pupil investigate the tilt of the Earth's axis. 3.1 Describe and illustrate the tilted position of the Earth, using appropriate visual aids. • 3.2 Calculate the angle of the tilt of the Earth's axis, using an appropriate graphic representation.

• Enrichment activity

Content	Details on the Content	Suggested Teaching/Learning Activities
Composition: Atmosphere, Hydrosphere, Lithosphere, Biosphere Satellite: Moon	The main component features of the Earth are: the atmosphere, the hydrosphere, the lithosphere, and the biosphere. Another characteristic of the Earth is the presence of a satellite, the Moon. It is not necessary to study the Earth's components in depth, nor is it advisable to focus on the presence of the planet's satellite. At this point it is enough to make the pupil aware of these features.	4. Have the pupil identify the main component features of the Earth. 4.1 Identify the different layers or spheres of the Earth, using an appropriate diagrammatic model. 4.2 Define the following terms: atmosphere, hydrosphere, lithosphere, biosfpere. 4.3 Identify each of the component features of the Earth, using a picture or a model of the planet. 4.4 Simulate a situation involving the survival of a human community on another planet. 4.5 Collect a number of newspaper and magazine articles about the Moon. 4.6 Highlight certain know characteristics of the Moon. 4.7 Look up the definition of the word "satellite." 5. Visit a planetarium, a natural science museum, an observatory, etc.

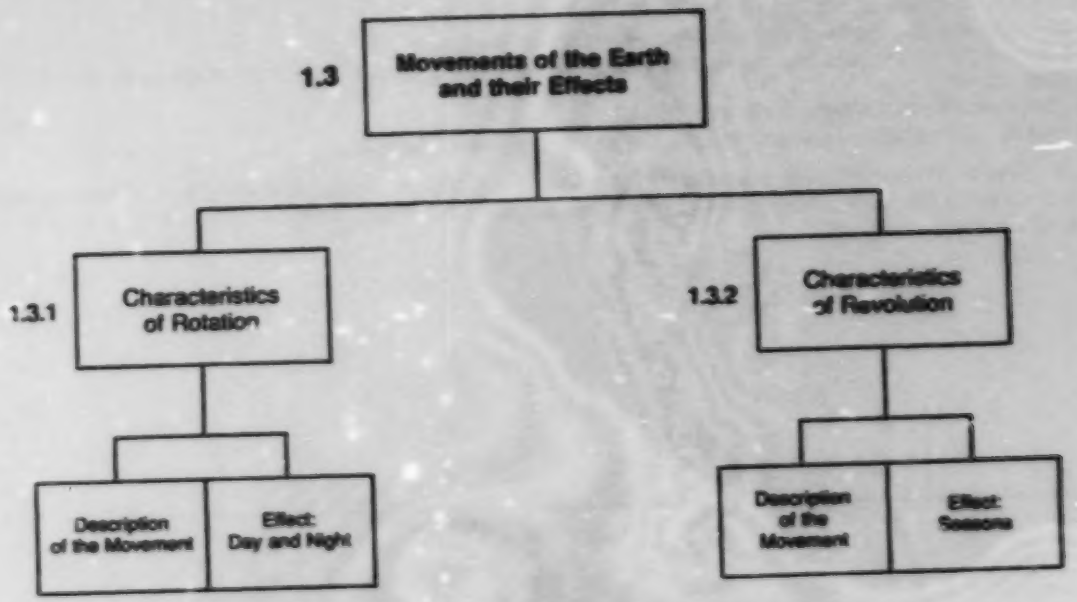
Unit 1.3

Terminal Objective **1.3 To distinguish between the movements of the Earth and to explain their consequences.**

Intermediate Objectives:

1.3.1 To describe the movement of rotation and to explain its effects.
1.3.2 To describe the movement of revolution and to explain its effects.

ORGANIZATION OF THE CONTENT



HOW TO TEACH UNIT 1.3

In addition to the features described in the preceding unit, the Earth is characterized by its two motions in space: it revolves around the Sun while rotating on its axis. While the pupil may have been acquainted with the two concepts of the Earth's revolution and rotation in elementary school, it would be worthwhile to check whether they have actually been assimilated. This unit is intented to help the pupil understand that rotation and revolution have a number of consequences which affect life on the planet.

To facilitate such an understanding, it is advisable to begin by explaining the nature of each of these two motions, using whatever instructional method is deemed appropriate. Once the pupil understands the mechanism of the Earth's rotation and revolution, it should be easier for him to grasp their consequences. Here instruction should be as concrete as possible, and the pertinent concepts and facts should be explained repeatedly.

Given that the pupil is not expected to understand every aspect of the Earth's motions in space but rather their influence on the life cycle on the planet, the frame of reference for the teaching of this unit should be the variety of observable everyday phenomena.

Like early Man, the pupil should observe and ponder certain phenomena related to the motions of the Earth. He might consider such questions as:

- Why is there day and night?
- How do we know that the Earth turns? How and when did we find out?
- Why does the length of day and night vary throughout the year and why is it equal only at the equinoxes?
- Does the Sun move?
- Why is it cold in winter and warm in summer?
- Why is it that the temperature is almost always the same in certain regions?

In this unit the pupil is introduced to the scientific information that will enable him to find the answers to these questions. His introduction to some of the laws of the Universe might actually stimulate his thinking, and even encourage him to pursue further personal investigations.

UNIT 1.3	**Terminal Objective: 1.3 To distinguish between the movements of the Earth and to explain their consequences.**	
	Intermediate Objectives: 1.3.1 To describe the movement of rotation and to explain its effects. 1.3.2 To describe the movement of revolution and to explain its effects.	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
Rotation Day Night	The rotation of the Earth is characterized primarily by its direction and duration, and by its effects on the biosphere. The primary effect of this motion is the day and night cycle, which influences the rhythm of everyday life on the planet.	1. Illustrate the Earth's rotation and its effects, the day and night cycle in particular. 1.1 Carry out the following experiment: have a pupil simulate the Earth's rotation, using a spotlight for the Sun and a ball for the Earth. 1.2 Draw a sketch to illustrate the Earth's rotation: – Position of the Sun, – Direction of movement, – Lighted area of the Earth.
Revolution Tilt Seasons	The revolution of the Earth is characterized mainly by: its orbit around the Sun, the duration and direction of this motion around the Sun, the Earth's axial tilt, and the planet's positions on the ecliptic plane during the year.	2. Illustrate the Earth's revolution and its effects, and, in particular, the cycle of the seasons. 2.1 Continue the experiment described in 1.1. Have the pupil circle around the spotlight while continuing to rotate the ball. 2.2 Draw a sketch on a sheet of paper to illustrate the Earth's revolution around the Sun: – Elliptical movement around the Sun, – Direction of movement, – Tilt and successive positions of the Earth on the ecliptic plane, – Seasons. 2.3 Construct a planetarium, using styrofoam.

Content	Details on the Content	Suggested Teaching/Learning Activities
	The primary effect of the Earth's revolution is the cycle of the seasons. Seasons are also caused by the Earth's tilted position in relation to the ecliptic plane. In other words, if we think of the Sun as a stationary object, the Earth's position varies throughout the year and the amount of sunlight received by the planet varies accordingly. Consequently, not only the seasons, but also the latitudes have to be considered in accounting for the variations in the amount of sunlight that reaches the Earth.	*Synthesizing Activities* 3. Highlight the different ways in which the Earth's rotation and revolution affect our lives: longer or shorter days and nights, apparent motion of the sun, time zones, seasonal activities. 3.1 Describe the position of the Sun at different times during the day. 3.2 Construct a table indicating the length of day and night during the months of the year, taking care to group the months into seasons. 3.3 Complete the preceding table by indicating a number of seasonal activities: recreation, agriculture, way of life, etc. 3.4 Discuss the itinerary of a migratory animal. 3.5 Take notice of time differences when watching television broadcasts of events that are taking place outside Québec.

Module 2

THE GLOBE, THE MAP OF THE WORLD, AND THE ATLAS

MODULE 2

CONTENTS

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INSTRUCTIONAL MATERIALS

Atlas
Globe
Maps of the world indicating political divisions (countries), physiographic regions (relief), and population density.

SUGGESTED AMOUNT OF TIME: About 15%

MODULE 2

THE GLOBE, THE MAP OF THE WORLD, AND THE ATLAS

GENERAL OBJECTIVES: **UPON COMPLETION OF THIS MODULE, THE PUPIL SHOULD BE ABLE TO LOCATE GEOGRAPHIC FEATURES ON THE GLOBE, ON THE MAP OF THE WORLD, AND IN AN ATLAS.**

Terminal Objectives:

2.1 To use geographical coordinates to locate features on the globe.

2.2 To use the globe, the map of the world, and an atlas.

OVERVIEW OF THE MODULE

This module focuses on one of the most important concepts in geography, namely, location. It seems essential that the secondary school pupil should acquire a sufficient knowledge of the map of the world, as such knowledge is frequently useful. Thus, an understanding of the layout of the world should give him a better grasp of current affairs and stimulate his interest in events that take place in other parts of the world. When introducing this module, references to current events might be a very effective way of arousing the pupil's interest.

Location activities require appropriate methods. That is why the first unit suggests the use of geographical coordinates to locate features with greater accuracy. The globe, the map of the world, and the atlas should be used in the second unit for the same purpose. The pupil must know how to handle these tools effectively if he is to locate geographical features more accurately.

The focus of instruction in this module is the means the pupil should use for locating places and geographical features. The different exercises involving the use of the local map are intended to prepare the pupil to use the globe and the map of the world. Since it is always advisable to approach a particular learning content by way of the pupil's experience, and since it is permissible to modify the sequence of the program's units and modules, the teacher might begin this module with orientation exercises similar to those suggested in Unit 3.1.

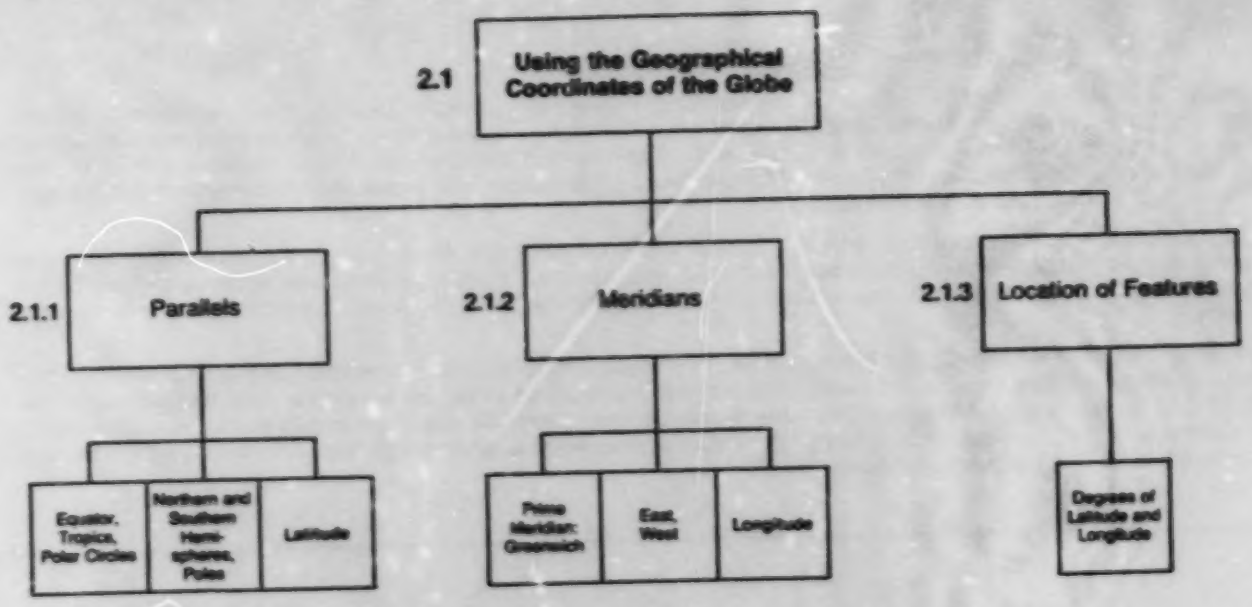
Unit 2.1

Terminal Objective **2.1 To use geographical coordinates to locate features on the globe.**

Intermediate Objectives:

2.1.1 To describe how parallels divide the surface of the globe.
2.1.2 To describe how meridians divide the surface of the globe.
2.1.3 To locate different features on the globe using latitude and longitude.

ORGANIZATION OF THE CONTENT



HOW TO TEACH UNIT 2.1

In the preceding module it was suggested that the globe be used to illustrate the motions of the Earth. In this unit, the globe can also serve as a visual aid to introduce the pupil to the system of geographical coordinates.

When teaching the content of this terminal objective, the teacher should start with the concepts of parallels and meridians before moving on to the more abstract concepts of latitude and longitude. These define the geographical coordinates which the pupil will later use to determine the precise location of places and features on the Earth's surface.

Even though the pupil may have learned about coordinates in elementary school, it is still advisable to move gradually from parallels and meridians to geographical coordinates. Repeated practice should enable the pupil to use coordinates with greater skill. At this point he should be able to locate places and features more accurately and, conversely, to identify places and features corresponding to a given set of coordinates.

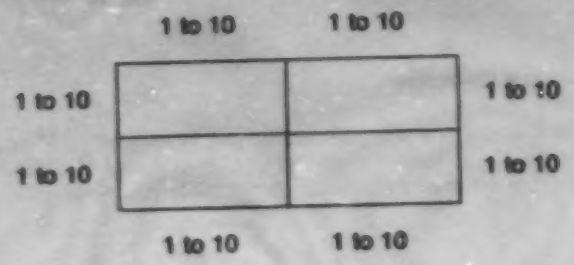
In summary, in this unit the pupil works at developing his ability to use the system of geographical coordinates for locating geographical features, improving his knowledge of the world in the process.

It should be stressed that the learning process here is a gradual one. That is why the teacher is urged to proceed step by step and to plan instructional activities that are as concrete as possible. Thus, in addition to using the globe and map of the world, it is recommended that graphs to illustrate the concepts and facts studied in this unit be constructed.

UNIT 2.1	**Terminal Objective: 2.1 To use geographical coordinates to locate features on the globe.**	
	Intermediate Objectives: 2.1.1 To describe how parallels divide the surface of the globe. **2.1.2 To describe how meridians divide the surface of the globe.** **2.1.3 To locate different features on the globe using latitude and longitude.**	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
The Globe Parallels Tropic of Cancer/Tropic of Capricorn Arctic and Antarctic Polar Circles Northern and Southern Hemispheres	The pupil should realize that a system of coordinates is necessary for locating features and places accurately. With respect to the parallels, the pupil should understand the following: – A geographical parallel is an imaginary circle located on a plane parallel to the Equator. – The parallel of origin is the Equator. It is the largest parallel and divides the Earth into the Northern and Southern Hemispheres. – By convention the parallels have been numbered from 0° to 90° on either side of the Equator. – The circumference of the parallels decreases the closer they are to the Poles. – The parallels serve to determine latitude. – The parallels are always the same distance apart.	1. Instructional situation: Ask the pupil to locate a specific place on the globe. It is up to him to find ways of doing so. 2. Teach the concept of parallel. 2.1 Illustrate the term "parallel lines" before defining it. 2.2 Observe the division of the globe into parallel circles. 2.3 Divide a circle into two equal parts to represent the Equator and the two hemispheres. 2.4 From the center of the circle draw a number of radii forming respectively 30°, 60°, and 90° angles with the diameter, that is, the Equator. Draw parallel lines to the Equator at the points where these radii intersect the circumference. 2.5 Represent the parallels of the Tropics (22½°) and the Polar Circles (66½°) in the same manner.

Content	Details on the Content	Suggested Teaching/Learning Activities
Latitude North and South Latitudes North and South Poles	As regards the concept of latitude, the pupil should understand the following: – Latitude is the location of a point or a place determined by its distance from the Equator measured in degrees. – All the points on a given parallel have the same latitude. – The North Pole (90°N) and the South Pole (90°S) are the most distant points from the Equator. – Climate can be related to latitude.	3. Teach the concept of latitude. 3.1 Number in degrees the parallels drawn at points 2.4 and 2.5 above. 3.2 Locate on the globe the parallels corresponding to the Canadian-American border, Québec's Far North region, the State of Florida, etc. 3.3 Locate on the globe the countries crossed by the 60°N and 60°S parallels, etc. 3.4 Identify the zones of hot, temperate, and cold latitudes, associating them with the corresponding parallels. 3.5 Calculate the number of kilometres corresponding to one degree latitude.
Meridians Prime Meridian	As regards meridians, the pupil should understand the following: – Meridians are imaginary semi-circles going around the globe through the poles. – The prime meridian passes through Greenwich, England. – By convention, the meridians are numbered from 0° to 180° both east and west of Greenwich. – The distance between the meridians decreases toward the Poles, which are their points of convergence. – Meridians serve to determine the longitude of a place.	4. Teach the concept of meridian. 4.1 Find the definition of meridian. 4.2 Draw the prime meridian on an outline globe. Starting from the prime meridian, subdivide the Equatorial Circle into equal segments. Using a length of string, draw meridian lines around the globe from these points through the Poles. Starting at the prime meridian, number the different meridians in degrees of longitude east and west. 4.3 With a compass draw a circle of X cm radius to represent the prime meridian. Identify the center of the circle as the North Pole. To represent the other meridians draw other radii at 30°, 60°, 90°, 120° and 180° angles with the first radius. Starting with the prime meridian number the different meridians from 0° to 180° longitude east. To mark the degrees of longitude west, proceed as before with the other half of the circle. 4.4 Other suggestions: An orange or a grapefruit could be used as visual aids to illustrate the division of the globe into meridians.

Content	Details on the Content	Suggested Teaching/Learning Activities
Longitude Longitudes East and West	As regards longitude the pupil should understand the following: – Longitude is the location of a point or a place determined by measuring its distance in degrees from the prime meridian. – All points on a given meridian have the same longitude. – The distance between two meridians varies. It is at its broadest at the Equator and at its narrowest at the Poles.	5. Teach the concept of longitude. 5.1 Distinguish countries of longitude east and of longitude west. 5.2 Give the longitude of a place. 5.3 Determine between what longitudes a particular continent, ocean, or country is located. 5.4 Identify the geographical features located at a particular degree of longitude. 5.5 Other suggestions: Build a globe to illustrate parallels and meridians.
Coordinates Geographical coordinates	Geographical coordinates refer to the grid of vertical lines (meridians) and horizontal lines (parallels) which make it possible to determine the precise location of a place by means of its longitude and latitude. The pupil's mastery of the concept of geographical coordinates is contingent upon his understanding of the simpler concept of coordinates. Ultimately, the pupil should be able to use parallels and meridians to "take bearings," that is, to determine the exact position of a place. However, only degrees should be used at this point, as their sub-division into minutes and seconds belongs essentially to the field of mathematics and would not be useful at this stage.	6. Teach the concept of coordinates. 6.1 Assign a letter to each horizontal row of desks and a number to each vertical row. Have each pupil locate his desk, using this grid. 6.2 Using the city plan of the neighborhood (See Module 1, Unit 2.2), find two streets which give the location of the school, the church, the grocery store, etc. 6.3 Draw a letter-and-number grid over the plan and give the coordinates of the school, the church, etc. 6.4 Identify other geographical features, using these coordinates. 6.5 Apply the concept of coordinates in other activities: rallye, treasure hunt, "join-the-dots" drawings, naval battle, etc. Example of a "naval battle" game: Each pupil has a 10 by 10 grid. The horizontal rows are identified by numbers, and the vertical rows by letters. The game requires two players. Each participant hides his ships. This adversary is supposed to find them and give their coordinates. The game can also be played with four 10 by 10 grids arranged as follows:

Content	Details on the Content	Suggested Teaching/Learning Activities
		Diagram  – The central lines represent the Equator and the prime meridian. The game provides an excellent opportunity to introduce the pupil to the concepts of longitude and latitude.
	As this point the pupil should be able to express geographical coordinates in the conventional manner. Example: 30°N, 90°W.	*Synthesizing Activity* 7. Have the pupil use geographical coordinates to locate places. 7.1 Find the geographical coordinates of a number of cities on a globe or map of the world. 7.2 Locate different places on the basis of their geographical coordinates.

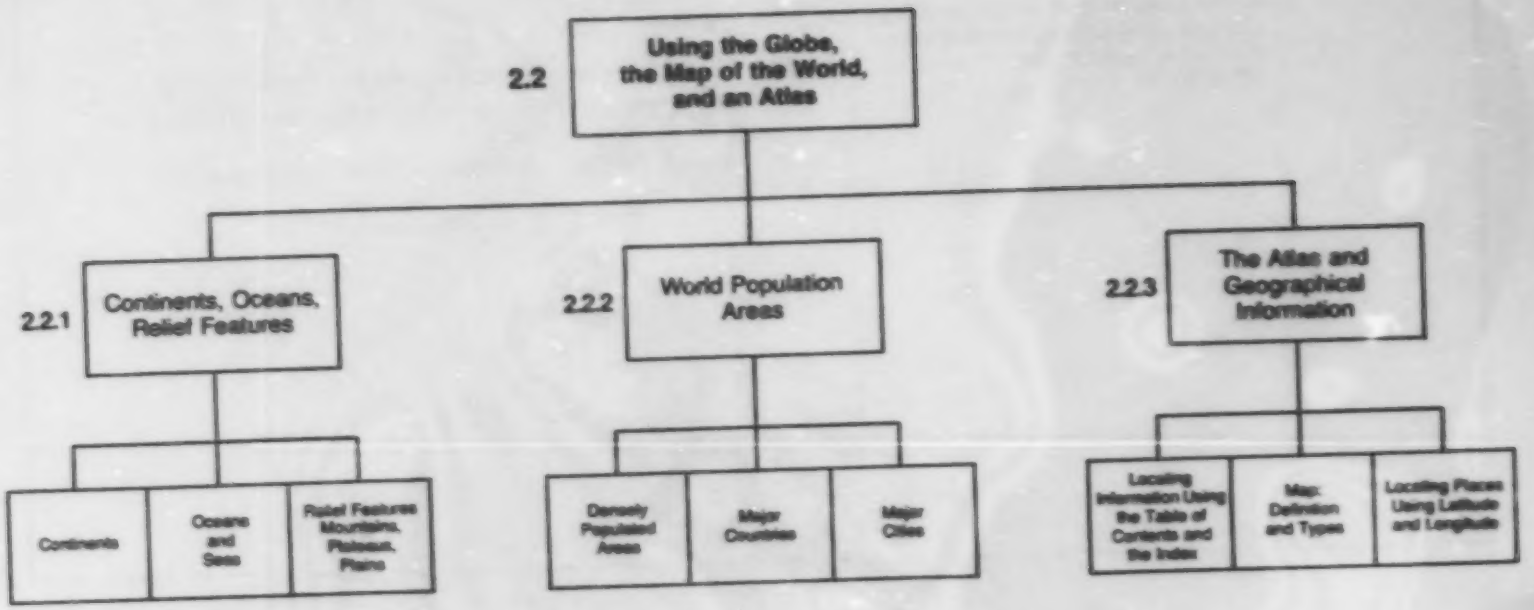
Unit 2.2

Terminal Objective **2.1 To use the globe, the map of the world, and an atlas.**

Intermediate Objectives:

2.2.1 To locate the continents, oceans, and major relief features.
2.2.2 To locate important densely populated areas of the world.
2.2.3 To use an atlas to locate geographical information.

ORGANIZATION OF THE CONTENT



HOW TO TEACH UNIT 2.2

Locating places and features is a basic activity in geography. It is a skill which the pupil must develop gradually. In Unit 2.1 he learned to use geographical coordinates to locate features and places, in Unit 2.2 he is expected to acquire a broad knowledge of the map of the world.

In this unit the pupil will learn to situate the continents, the oceans, and the major relief features as well as the main populated regions of the world. He is also expected to know where the major countries and big cities of the world are located. However, since the subject of world population is studied in greater detail in Unit 5.1, the teacher might find it worthwhile to cover intermediate objective 2.2.2 within that unit.

Obviously, the terminal objective requires the pupil to use the globe and the map of the world. Without these concrete learning aids, the whole enterprise might be reduced to tedious memorization exercises. The pupil is also expected to use the atlas once he has learned how to handle this reference source. The teacher should encourage him to do so by showing him how easy it is to find needed information simply by consulting the table of contents and the index.

The aim is to enable the pupil to develop his ability to use some of the geographer's "tools" (globe, maps, atlas) so that he can gradually increase his knowledge of the world.

UNIT 2.2	**Terminal Objective: 2.2 To use the globe, the map of the world, and an atlas.**	
	Intermediate Objectives: 2.2.1 To locate the continents, oceans, and major relief features. **2.2.2 To locate important densely populated areas of the world.**	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
Globe Map of the world Continents Oceans Seas	Before learning to identify continents and oceans, the pupil should be aware of the relative distribution of land and water on the planet. It is not necessary to use precise numbers. It should be enough to give a broad idea of the ratio of land masses to water. Example: *There is three times as much water as land.* This objective is in a way an initial step toward a better knowledge of the world. And it is to foster such a knowledge that the pupil will be using the globe and the map of the world to learn to locate certain features of the planet, namely: – *The Oceans:* the Atlantic, the Pacific, the Indian Ocean, the Antarctic, and the Arctic; – *The Continents:* the Americas, Eurasia, Africa, Australia, Oceania, Australasia, and Antarctica; – *The Seas:* the Hudson Bay, the Mediterranean, the North Sea, the Carribbean Sea.	1. Since the globe is the best model of the planet, it can be used quite effectively to illustrate the distribution of land and water on Earth. 1.1 Ask the pupils whether Earth is an appropriate name for our planet. 1.2 Compare in proportional terms the areas of the bodies of water and land masses: – on the entire planet, – in each of the four hemispheres (Northern, Southern, Eastern, and Western). 1.3 Identify the different continents and oceans. 1.4 Identify some seas. 1.5 Identify the particular oceans and/or seas that touch each continent.

Content	Details on the Content	Suggested Teaching/Learning Activities
* Map projections	Before moving on from the globe to the map of the world, the pupil should be made aware of the difficulty involved in transposing a curved surface onto a plane surface. Without having to explain in detail the different types of projections, the teacher might point out the fact that the profiles of landforms and other features change as a result of this transposition. He might also indicate that parallels and meridians undergo an analogous transformation when transferred from the globe to a map of the world. The pupil might want to know why the appearance of certain landforms and other features varies from one map to the next. The teacher should be ready to answer his query.	• 2. Carry out the following exercises, using a Mercator projection map: 2.1 Compare the surface areas of Greenland or Australia with that of Africa as they appear on a globe and on a map of the world. 2.2 Repeat the exercise, this time with a country located on the Equator. 2.3 Compare the alignment of the meridians and parallels on the globe and their arrangement on a map of the world. 2.4 Highlight some features related to the shapes and surface areas of the different countries as they appear on various atlas maps of the world which use different types of projections to suit different themes.
Location of the oceans	This objective is not concerned with investigating the composition of the oceans. This will be done in Objective 4.4.1. To locate the oceans on a map of the world it is necessary to refer to a number of spatial features. Thus, an ocean's location might be determined in relation to the hemispheres and the continents, or in terms of its shape and surface area.	3. Highlight certain characteristic features of the oceans, using different maps of the world and pertinent documents. 3.1 Find the definition of an ocean and a sea. 3.2 Compare the areas of the different oceans. (This can be done more effectively if a grid is used). 3.3 Construct a table in which the following spatial features of each ocean are indicated: location in relation to the continents, shape, approximate area. 3.4 Find photographs and other illustrations pertaining to the oceans. 3.5 Show films or television programs about the oceans in which some of their characteristic features are highlighted.

* Content related to an optional objective

• Enrichment activity

Content	Details on the Content	Suggested Teaching/Learning Activities
Location of the continents and major countries	The geographical position of a continent or a country can be determined in relation to the hemispheres or other continents and countries. However, to locate a continent or country more accurately it is better to use geographical coordinates. For example, Canada is located in the Northern and Western Hemispheres: – north of the United States, – west of Europe, – east of Asia, – west of the Atlantic, – east of the Pacific, – south of the Arctic, – between latitudes 42°N and 83°N and longitudes 53°W and 141°W.	4. Highlight various characteristics of the continents, using a variety of maps of the world and pertinent documents. 4.1 Make the distinction between continents and countries. 4.2 Give a brief description of each of the continents, highlighting the following characteristics: location, approximate surface area, shape. 4.3 Draw an outline map of the different continents on a grid of coordinates, based on the latitude and longitude degrees by which they are identified. 4.4 Reproduce the map of the world, drawing appropriate geometric shapes to represent the different continents. 4.5 Using a political map of the world, identify on each continent the major countries in terms of surface area: U.S.S.R., Canada, China, United States, Brazil, Australia. 4.6 Select a number of exploration stories that illustrate the fact that almost every corner of the world has been discovered (mountain tops, the Poles, deserts, jungles, etc.). 4.7 Start constructing a personal atlas, beginning with an outline map of the different continents, major countries, oceans and seas. 4.8 Make a free-hand drawing of the continents.

Content	Details on the Content	Suggested Teaching/Learning Activities
Major relief features Mountains Plains Plateaus	This objective is intended as an introduction to the major relief features of the planet as they appear on physiographic maps of the world. The pupil is expected to be able to identify at least: – these mountain ranges: Himalayas, Andes, West Cordillera, Alps; – these plains or lowlands: Great Plains in North America, Northern Plain in Europe, Russian Plain in U.S.S.R, Amazon Basin and Pampas in South America; – these plateaus: Laurentian Plateau in North America, Brazilian Plateau in South America,* African Plateau in Southern Africa,* Deccan Plateau in India,* Siberian Plateau in U.S.S.R.*	5. Highlight the major relief features of the continents, using a physiographic map of the world or a relief globe. 5.1 Review briefly the concepts and facts pertaining to relief studied in elementary school: altitude, mountains, plains, plateaus. 5.2 Observe how relief is represented on a hypsometric map, which is based on the measurement of heights on the surface of the earth, with reference to sea level. 5.3 Observe the high-altitude regions corresponding to various mountain ranges. Identify the Himalayas, the Andes, the Western Cordilleras, and the Alps. 5.4 Observe low-altitude regions. Identify the Great Plains in North America, the Northern Plain in Europe, the Russian Plain in the U.S.S.R., and the Argentinian Pampas in South America. 5.5 Observe mid-altitude regions corresponding to various plateaus. Identify the Laurentian Plateau in North America, the Brazilian Plateau in South America,* the African Plateau in Southern Africa,* the Deccan Plateau in India,* and the Siberian Plateau in the U.S.S.R.* 5.6 Complete your personal atlas by indicating the major relief features on a map of the world.

* Activity related to an optional objective

Content	Details on the Content	Suggested Teaching/Learning Activities
World population concentration zones Major populated areas Major countries Major cities	As pointed out in this unit's section on instructional methodology (2.2), this intermediate objective can be transferred to Module 5. If the teacher decides to cover it in Unit 2.2, he must handle it in such a way as to enable the pupil to improve his knowledge of the map of the world. The immediate concern of this objective is the pupil's ability to identify and locate the areas of high population concentration. The pupil should be able to locate the following on a map of the world: (a) The major populated areas: East and Southeast Asia, Northwestern Europe, the American Northeast, Central America; (b) The countries with the largest populations: China, India, U.S.S.R., United States, Indonesia, Japan, Brazil; (c) The biggest cities: Shanghai, Mexico City, Tokyo, Peking, New York, Sao Paulo, London, Moscow, Seoul, Bombay.	6. Using a world population density map, 6.1 Locate the following population zones: East and Southeast Asia, Northwestern Europe, the American Northeast, the American West, Central America. 6.2 Complete the preceding exercise by identifying, with the help of a political map of the world, the countries with the largest populations: China, India, U.S.S.R., United States, Indonesia, Japan, Brazil. 6.3 Locate the ten largest cities in the world. (Source: U.N., 1982). 6.4 Complete your personal atlas by recording on the outline map of the world the place names listed at 6.1, 6.2, and 6.3 7. It might be interesting to superimpose two transparencies representing respectively the political map of the world and the world population density map. This would enable the pupil to associate in his mind the population density zones and the corresponding countries. 8. It might be pertinent to make the connection between low-altitude regions (activity 5.4) and population concentration zones (Activity 6.1).

UNIT 2.2	**Terminal Objective: 2.2 To use the globe, the map of the world, and an atlas.**	
	Intermediate Objectives: 2.2.3 To use an atlas to locate geographical information.	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
Atlas Index Table of contents Map Types of maps	Here the pupil is expected to become sufficiently familiar with the make-up of the atlas to use it as efficiently as a dictionary. Thus, he should be able to refer to the index and the *table of contents* to locate places. Similarly, he should be aware of the different *types of maps* he can find in an atlas.	1. Thumb through an atlas to find its different features: table of contents, table of standard symbols, types of maps, alphabetical index, etc. 2. Distinguish the different types of maps found in an atlas. 3. Use the table of contents to find the appropriate maps for a theme, a country, etc. 4. Find the appropriate map in an atlas for a particular subject of study: a country, a city, a sea, a climate, etc. 5. Compare the organization and representation techniques of different atlases. 6. Use the index to find out which map to use to locate a particular place. *Synthesizing Activity:* 7. Plan a trip through the province, the country, and the world, using the atlas. Examples: – Plan a route that will take you through the ten largest cities in the world. – Identify the countries you can visit along the Atlantic coast. – Identify the countries you can travel through along parallel X.

Module 3

TOPOGRAPHIC MAPS, ROAD MAPS, AND CITY PLANS

MODULE 3

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INSTRUCTIONAL MATERIALS

Compasses (About 35 for each classroom) – Recommended model: Sylva Polaris, Type 7 NL or equivalent.
Topographic map (1 per pupil).
Québec road map (1 per pupil).
City plan (1 per pupil).
Representations or illustrations of landforms.

SUGGESTED AMOUNT OF TIME: About 25%

MODULE 3

TOPOGRAPHIC MAPS, ROAD MAPS, AND CITY PLANS

GENERAL OBJECTIVE: **UPON COMPLETION OF THIS MODULE, THE PUPIL SHOULD BE ABLE TO USE TOPOGRAPHIC MAPS, ROAD MAPS, AND CITY PLANS.**

Terminal Objectives:

3.1 To determine direction using different methods.

3.2 To use the principal components of maps.

3.3 To read the ways in which relief is shown on topographic maps.

3.4 To use maps of various types.

OVERVIEW OF MODULE 3

In this module the pupil will be studying maps as a basic tool in geography. While he has been using maps since the beginning of the course, he will now be studying them in a more formal and systematic way. More specifically, he will be dealing with the principal components of maps, namely, orientation, scale, coordinates and symbols. Different types of maps will be examinated in order to reinforce the pupil's understanding of these concepts and ideas pertaining to cartography. In this introduction to map reading, the aim is to help the pupil develop his ability to use maps in everyday life. Since children of this age and even some adults often do not know how to handle a map and are unaware of its usefulness, it might be worthwhile to select a variety of exercises which will illustrate the many uses to which a map can be put. At this point, however, the main concern is to enable the pupil to acquire a basic knowledge of maps. Later, he will learn how to make more effective use of topographic maps, road maps, and city plans. The Topographic Map of Beloeil (31H-11-200-0102) included in this course will be studied in greater detail in Secondary III in the Geography of Québec and Canada course.

The ministère de l'Éducation has made available to teachers the following guides in order to help them plan their courses:

1. *Road Maps, – User's Guide* (Available from the M.E.Q.).
2. *Topographic Map of Beloeil – User's Guide* (Included in Appendix I of this Curriculum Guide).

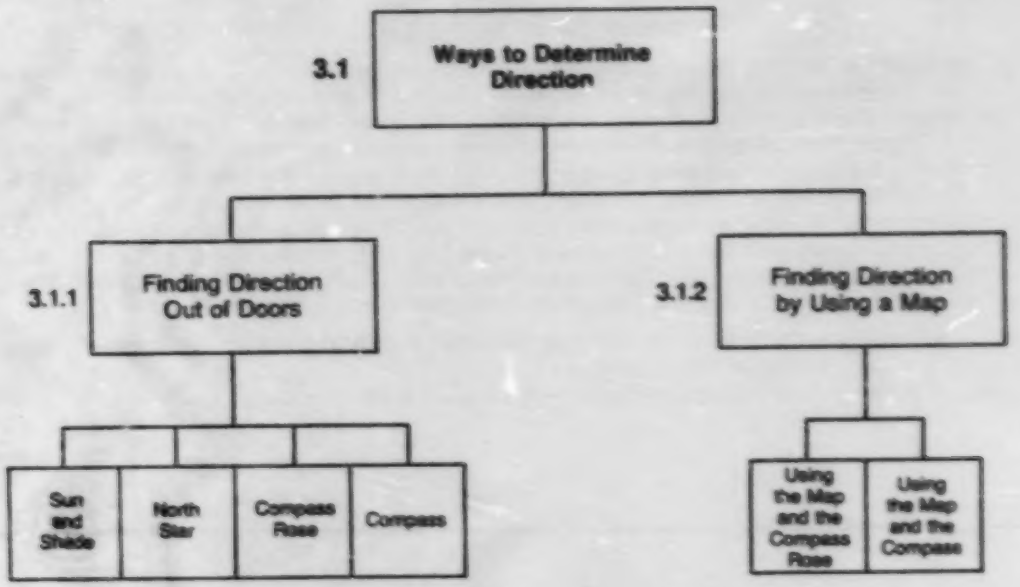
UNIT 3.1

Terminal Objective **3.1 To determine direction using different methods.**

Intermediate Objectives:

3.1.1 To use different ways of finding direction out of doors.
3.1.2 To use a map to determine direction.

ORGANIZATION OF THE CONTENT



HOW TO TEACH UNIT 3.1

Man has always found it necessary to take his bearings, that is to say, to determine his position on Earth. That is why there are a number of universally recognized points of reference that are used to find direction. In this first unit, the pupil will learn how to find direction, using the means readily available in nature. He is expected to be able to observe and to pick up the various signs that can help him find his way. For example, by observing the apparent movement of the sun and the different positions of shadows throughout the day, he should be able to find the cardinal points. Similarly, the North Star can help him identify the North and, consequently, the other cardinal points. Popular wisdom has also established other ways of determining direction on the basis of signs provided by nature – certain characteristics of vegetation, for instance.

It should be pointed out that some of the concepts and skills pertaining to orientation in this unit should have been covered prior to some of the activities suggested in the preceding modules. Consequently, given the inherently flexible nature of the course, the teacher will decide when to work on these concepts and skills.

In addition to the different natural methods of determining direction, in this unit the pupil will be required to use the compass, a trustworthy and easy to use instrument. Before the pupil actualy uses the compass, the teacher should make sure he understands its make-up and operation. The first step might be to carry out a number of exercises which require the pupil to find directions, thus enabling him to be thoroughly familiar with the location of the cardinal points. Subsequently, through a series of exercises involving the use of the compass, the pupil will reinforce his ability to find direction.

Finally, the pupil will learn how to use the map to find direction. In view of their scientific basis, maps are trustworthy instruments. In addition, they can be easily understood by the pupil and the opportunities to use them in everyday life are many. It is essential, therefore, that the pupil learn how to use them, which can be accomplished be means of practical exercises with different types of maps. In the process the pupil will discover how useful maps are for finding direction, locating places and features, and so on.

UNIT 3.1	**Terminal Objective: 3.1 To determine direction using different methods.**	
	Intermediate Objectives: 3.1.1 To use different ways of finding direction out of doors. **3.1.2 To use a map to determine direction.**	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
Direction Position of the Sun Cardinal points: North, South, East, and West	In this unit the pupil learns different methods for finding direction out of doors, namely, by using: the sun, shadows, the North Star, the compass, and the map. The pupil should be reminded that due to the Earth's rotation the sun is seen in the east in the morning, in the south at noon, and in the west in the evening.	1. Find out how one can determine direction by the sun. 1.1 Highlight and illustrate the different positions of the sun during the day. 1.2 Experiment 1: Find direction by the sun. Ask the pupil to stand with his arms stretched and his back to the sun at noon. The sun being in the south, he will be facing north. His right arm will be pointing east, and his left arm west. 1.3 Experiment 2: Find direction with an analog watch, using the sun as point of reference. Ask the pupil to hold his watch horizontally, then to turn it so that the hour hand is pointing to the sun. The direction north is found mid-way between the number 12 and the hour hand.
Position and length of shadows Landmarks	The teacher should stress the fact that in the Northern Hemisphere projected shadows are shorter when the sun is in the south (at noon) and that such shadows point north. It is useful to be familiar with certain landmarks that can serve as reference points to find direction.	2. Find out how one can find direction using shadows. 2.1 Have the pupil observe in the field that the position and length of the shadow projected by an object vary in the course of the day. 2.2 Looking in the direction of the shadow projected by an object at noon, situate the north (ahead), the east (to the right), the west (to the left) and the south (in back). 2.3 Identify what can be seen to the north, south, east, west. Example: To the north, I see the factory, the church, etc. 2.4 On drawings showing shadows in different positions and of different lengths identify the direction of the sun and the time of day. 2.5 Construct a sun dial which can be used for Activity 2.4.

Content	Details on the Content	Suggested Teaching/Learning Activities
The North Star Constellation Ursa Major Ursa Minor	The North Star can be identified by means of the stars in the Ursa Major (Big Bear) and Ursa Minor (Little Bear) constellations. The seven stars in the tail of the Big Bear form the Bid Dipper. Two bright stars in the cup of the Big Dipper are known as pointers. They point upward to the North Star, which always indicates the North. *Observation Subjects* – It can be pointed out that in general the foliage of trees is denser on their south side than on their north side (geotropism). – It can be pointed out that the trunk of trees often tilts to the east (geotropism and prevailing westerlies in our hemisphere). – Note: While they do have a certain importance, these beliefs should not be considered absolutely true as they have not been scientifically investigated.	3. Find out how to determine direction using the *North Star*. 3.1 Locate the North Star on a picture of the Big Bear. 3.2 Ask the pupil to identify the North Star and the North on a sketch, a photograph, or a map of the sky. Then ask him to identify what he sees in each direction. Example: To the north, I see the school, etc. 4. Identify in *nature* other means of finding direction. 4.1 Observe the arrangement and characteristics of the trunk and foliage of trees in general. 4.2 Notice that moss generally grows on the north side of trees.

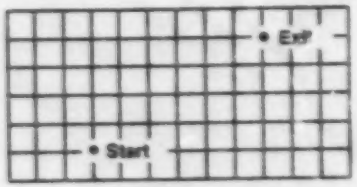
Content	Details on the Content	Suggested Teaching/Learning Activities
Boreal Austral Oriental Septentrional Meridional Occidental[1]	The pupil is supposed to have learned how to find direction in elementary school. It might be worthwhile, however, to check what he knows and remembers, and to review certain concepts and facts. As pointed out earlier, this review could take place at the beginning of the course, especially as the concepts and skills pertaining to direction finding are required in several activities in Modules 1 and 2.	5. Review a few concepts and facts pertaining to direction finding by carrying out a number of exercises. 5.1 Locate the North in the classroom and indicate it by means of an arrow on the floor or the ceiling. To find the North the pupils might use the position of the sun at different times during the day. (See Experiment 1, p. 60). 5.2 Locate the other cardinal points. 5.3 Carry out a variety of exercises involving direction finding. 5.3.1 Find out in what direction the classroom desks, the school's corridors, or the streets of the neighborhood, are laid out. 5.4 Review the different steps followed to set the neighborhood plan in the first unit of Module 1 (p. 23). 5.5 Remind the pupil that unless otherwise indicated, the top of a map corresponds to the North. 5.6 With the help of a dictionary relate the following terms to the cardinal points: boreal, austral, oriental, septentrional, meridional, occidental.[1]
Compass card Cardinal Points and Intermediate Positions: NE, SE, SW, NW	A compass card is a star-shaped figure which indicates the direction of the cardinal and intermediate points. On some compass cards there are up to 32 intermediate points. To obtain more precise directions the circle of the compass card is divided into 360 degrees. By convention North is found at 0°, East at 90°, South at 180°, and West at 270°. It is relatively easy to determine the degrees corresponding to the intermediate points. In the first cycle of secondary school it is advisable to use only eight directions.	6. Describe the compass card as a means of finding direction. 6.1 Construct a compass card: 6.1.1 Take a 6 cm square sheet of paper. Fold it in half, then in half again vertically, then in half again diagonally. Round the corners with a pair of scissors. Open the sheet and mark the folding marks: N, NE, E, SE, S, SW, W, NW. 6.1.2 Draw a compass card, indicating the degrees, cardinal points, and intermediate positions.

1 Though correct, these terms are not all in common English usage.

Content	Details on the Content	Suggested Teaching/Learning Activities
	A map with a drawing of a compass card is a useful tool for finding directions. Several of the activities suggested here have already been covered in Unit 1.1.	6.2 Find pictures of a compass card in an atlas, a dictionary, or on maps. Define a compass card. 6.3 Using a city plan, a municipal map, or a regional map containing a compass card: 6.3.1 Indicate the position of the other cardinal points on the map. 6.3.2 *Set the map* by moving it so that the arrow indicating the north coincides with the north in the classroom. (See Activity 5.1, p. 61). 6.3.3 Using a city plan or a neighborhood plan: – Find the North; identify the buildings located in the northern part of the city or of the neighborhood. – Locate the school; give its position in relation to the map or plan and in relation to other buildings. – If you walk northeast from the school, what buildings will you pass? – In what direction do you have to walk to go from the church to the school? – What are the directions of the main street? – If you walk east on X Street and then turn left, in what direction are you going? – Give the direction to follow to go from the school to the business district.
Compass Cardinal points and intermediate positions Degrees Geographic North Magnetic North	The dial of a compass is essentially a reproduction of the compass card. The letters on the dial represent areas and identify the cardinal points and intermediate positions. The division of the dial of the compass into degrees has been explained in this column on the preceding page.	7. Use the compass as an instrument for finding direction. 7.1 Familiarize the pupil with the compass. 7.1.1 Examine different compass models. 7.1.2 Identify the different parts of the compass: dial, areas, needle, direction lines and arrow. 7.1.3 Draw a sketch representing the areas of the compass.

Content	Details on the Content	Suggested Teaching/Learning Activities
	It is important that the pupil understand that the magnetic needle of the compass indicates the magnatic north, which is different from the true geographic north, commonly known as the North Pole. However, at this level it is not pertinent to focus on the concept of magnetic declination or to teach the pupil how to calculate it. It is enough to mention that it will be studied in Secondary III. Several interesting routes are likely to be found in the local area. Consequently, the teacher should not hesitate to multiply the activities which require the use of the compass. Such activities should improve the pupil's ability to handle this instrument effectively. The selected landmarks should be at a reasonable distance from each other and readily identifiable in the surrounding environment. In addition, the pupil should choose the most accessible path and be careful to avoid objects that could cause the magnetic needle to deviate.	7.2 Carry out a variety of exercises involving finding direction with the compass. 7.2.1 Determine the direction of a base line by turning the compass until the north end of the needle is positioned just above the letter N on the dial. When the needle stands still it indicates the magnetic North Pole. 7.2.2 Determine the direction of the classroom walls, using the compass. 7.2.3 Follow a certain route in a particular direction, using the compass. *How to proceed:* 1. Adjust the dial so that the arrow points to the desired direction; 2. Turn around until the magnetic needle indicates the North; 3. Note that the direction arrow indicates *the direction to follow;* 4. Locate a landmark in that same direction and walk up to it; 5. Repeat the same operation from landmark to landmark to the end of the route. • 7.2.4 Organize a rally around the school or in the neighboring woods. 7.2.5 Set a map, using a compass. 7.2.6 Verify the direction data obtained in the following exercises: Activity 2.1 (Finding direction by observing shadows); Activities 3.2 and 3.3 (Finding direction by means of the North Star). • 7.3 Investigate the invention of the compass and the discoveries it has made possible.

• Enrichment activity

Content	Details on the Content	Suggested Teaching/Learning Activities
	The magnetic needle should not be used in this exercise. The teacher might point out to the pupil that after finding the direction of route A – B by means of the compass, the instrument can subsequently be used to follow the said direction in the field.  	8. Investigate how to find direction using a map and a compass. 8.1 Find direction(s) on a map using the compass. *How to proceed:* 1. Identify the starting point (A) and the destination point (B) on the map; 2. Align the edge of the compass with points (A) and (B) so that the arrow points to the destination point (B); 3. Turn the dial of the compass so that the direction line N/S is parallel with the vertical N/S grid of the map (the meridians) and that the arrow which indicates the north on the dial points to the north of the map. 4. Read the number of degrees in front of the direction arrow. 9. Carry out a variety of exercises and games that can help the pupil develop his ability to find directions in terms of the cardinal points. 9.1 Game: Sixteen pupils standing in a circle represent a compass card. The pupil at the center has to throw the ball in the direction indicated by the teacher. 9.2 Game: Sixteen pupils standing in a circle represent a compass point by following these directions: Trace an unbroken line 2 squares N 4 squares E 1 squares S 2 squares W 2 squares S 6 squares E 3 squares N 2 squares SW 1 squares W 2 squares N 1 squares NE 1 squares N Note: Pupils usually enjoy similar games in which they are required to complete a drawing. 9.3 Imagine various situations in which the pupil would need to find direction and determine his position. Example: Being lost in a forest, downtown, etc. 9.4 Describe orally or in writing different methods of finding direction. Example: The pupil is expecting a visit from a distant friend and he has to write down directions to his house.

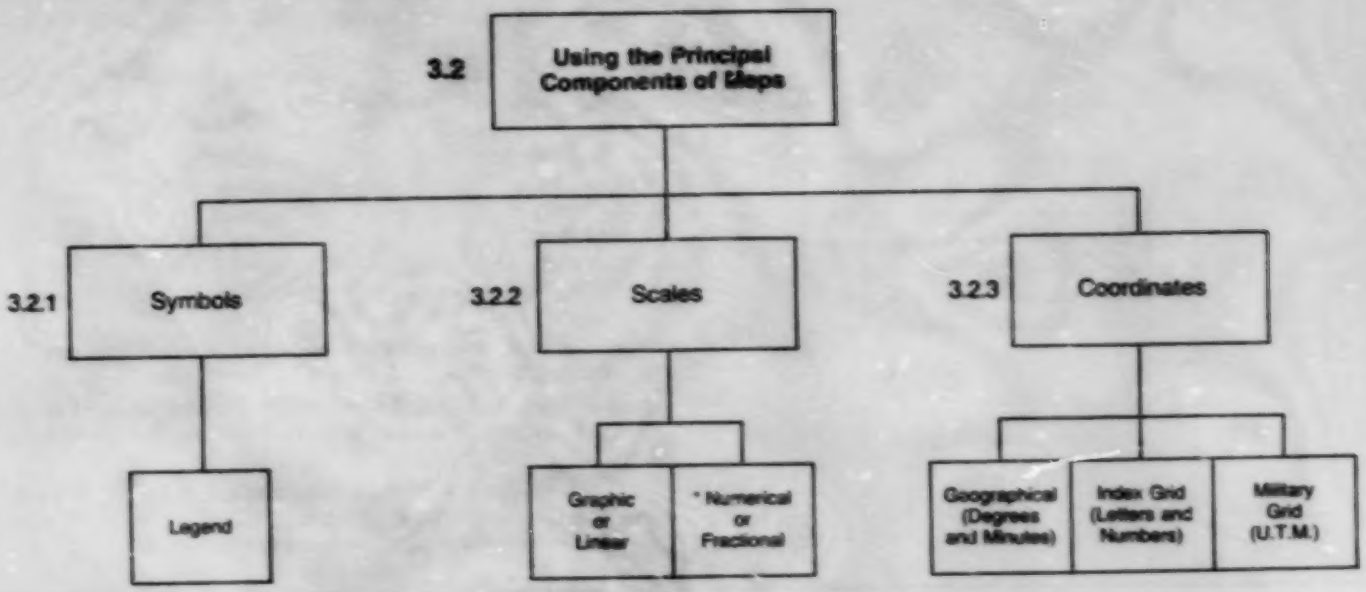
UNIT 3.2

Terminal Objective **3.2 To use the principal components of maps.**

Intermediate Objectives:

3.2.1 To decode the principal symbols used.
3.2.2 To use graphic and * numerical scales.
3.2.3 To use different types of coordinates.

ORGANIZATION OF THE CONTENT



* Objectives (or parts of objectives) with an asterisk are optional.

HOW TO TEACH UNIT 3.2

In Unit 3.1 the pupil had to use the map as a tool for finding direction and determining position. The pupil must be familiar with the different components of a map if he is to use it effectively. A map is a graphic representation of physical features and the pupil should be able to decode its principal symbols in order to extract the information it contains.

The features represented on a map are reduced on a scale of varying magnitude. It is essential that the pupil understand this concept of reduction scale, as he will be using several maps in the course of the year. In this unit the pupil will learn about reduction scales, and once he understands the principle of scale reduction he should be able to calculate distances according to the particular scale of a map. As suggested in the course description, at this particular level the teaching of numerical (or fractional) scales is optional. The activities involving numerical scales are being suggested only for enrichment purposes.

In Unit 2.1 the pupil had the opportunity to familiarize himself with geographical coordinates. In the last intermediate objective of Unit 3.2, he is required to use other types of coordinates, in particular alphabetical and numerical grids and topographical coordinates. These are systems of location which make it possible to situate a point accurately.

In teaching this unit it is necessary to make use of different types of maps. Concepts and skills pertaining to maps should not be studied only from a theoretical point of view, but also in their usual context, that is, using a map. It is also advisable to carry out a variety of exercises which would enable the pupil to assimilate these concepts and skills and to apply them in everyday situations.

UNIT 3.2	**Terminal Objective: 3.2 To use the principal components of maps.**	
	Intermediate Objectives: 3.2.1 To decode the principal symbols used.	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
Map Symboli-zation Symbols Standard signs Pictograms	A map usually contains the following elements: – a title, – colors, – geometric symbols (figures), lines, pictograms, – a legend, – words and figures, – a compass card, – a scale.	1. Teach the concept of *symbolization*. 1.1 Identify various symbols which are frequently used in everyday life. Examples: traffic lights, mathematical signs, money symbols, road signs, acronyms, etc. 1.2 Have the pupil represent a variety of objects by means of symbols. 1.3 Compare the different ways in which an object can be represented in order to show why it is important to use standard signs. 2. Describe the symbols which are usually found on geographic maps. 2.1 Using aerial photographs and large-scale maps of a given landscape, describe the symbols used to represent the different features of that landscape: houses, roads, vegetation, bodies of water, etc. 2.2 Study the use of *colors* on several maps and answer these questions: 2.2.1 Which elements are generally represented by a particular color? 2.2.2 Should certain colors be used in preference to others? Pale colors as opposed to darker shades, for instance? 2.2.3 In what color are the words usually printed? 2.3 Examine the *symbols* used on a variety of maps and then: 2.3.1 Identify the types of *symbols* used on a particular map and the physical and other features to which they correspond.

Content	Details on the Content	Suggested Teaching/Learning Activities
Proportional symbols	Proportional symbols serve as a basis for quantifying certain data represented on a map.	2.3.2 Distinguish between road, river, and boundary symbols. 2.3.3 Distinguish between different types of roads. 2.3.4 Distinguish between cities of different sizes. 2.3.5 Distinguish between capital cities and other cities. 2.3.6 Identify a number of stylized drawings and tell what they represent. Examples: the profile of an airplane, etc. 2.3.7 Find out what the letters and figures on a road map or city plan correspond to. 2.3.8 Find out by which numbers the main roads of the region are identified. 2.3.9 Explain the function of the compass card on a geographic map. (Cf. preceding unit).
Legend	The legend explains what the symbols used on the map stand for.	2.4 Examine the legend that appears on a variety of maps and then: 2.4.1 Describe the usual content of a map legend. 2.4.2 Indicate the usual position of a legend on maps. 2.4.3 Classify symbols into two categories, distinguish those which stand for the physical features of a landscape from those which represent its man-made features. *Synthesizing Activity* 3. Develop a legend that explains the symbols on an aerial photograph or a map with a hidden legend.

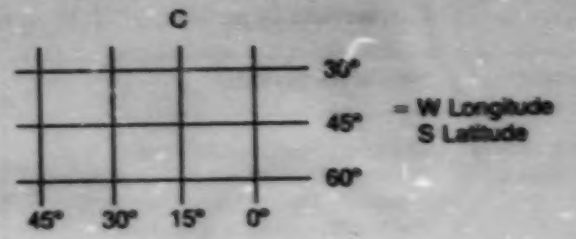
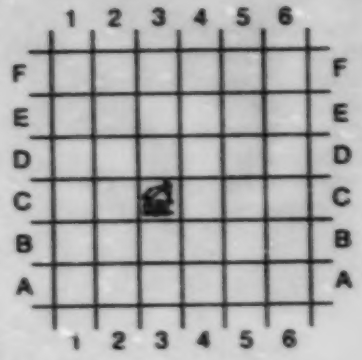
UNIT 3.2	**Terminal Objective: 3.2 To use the principal components of maps.**	
	Intermediate Objectives: 3.2.2 To use graphic and numerical scales.	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
Reduction	The pupil needs to understand the concept of reduction before being able to deal with the idea of map scale.	1. Identify a number of objects representing real objects on a reduced scale. Examples: photograph, drawing, scale model, etc.
Plan Proportional reduction Scale Large scale Small scale	The idea of reducing a large surface to a smaller one is not new to the pupil, as he was introduced to it when he learned to draw plans in elementary school. He should, therefore, be familiar with the concept of scale and be able to establish a scale when he knows: (a) the size of the sheet on which he intends to draw his map, (b) the surface area he has to represent, (c) the type of mathematical operation he needs to perform to reduce a surface.	2. Point out that a map is a proportional representation of a reality on a reduced scale. 2.1 Establish the appropriate scale for reproducing the surface area of the classroom on a sheet of paper. 2.2 Establish the appropriate scale for reproducing the surface area of Québec (1,5 million km²) on a sheet of paper. 2.3 Compare maps of different scales to find out that details are not always visible on a small scale map. 2.4 Compare large and small scale maps to find out why a particular scale has been used. 2.5 Compare the reductions obtained in Activities 2.1 and 2.2 and associate the twin concepts of large and small scale. 2.6 Find out what type of scale (small or large) is appropriate for making a map of a recreational park, the province, the world, the parish, etc. 2.7 Given a scale of 1 cm to 10 km, calculate what 7 cm on a map is equivalent to in actuality. 2.8 If the scale were 1 cm to 5 m, what would be the equivalent of 5 m, 15 m, and 100 m on the map?
Verbal scale	This scale is often expressed in sentence form. It is referred to in this case as a "verbal scale." Example: "1 centimeter = 1 meter" means that one centimeter on the map represents 1 meter on the ground. This scale is commonly known as a *verbal scale*.	

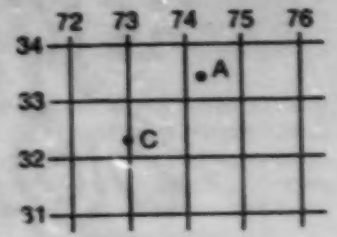
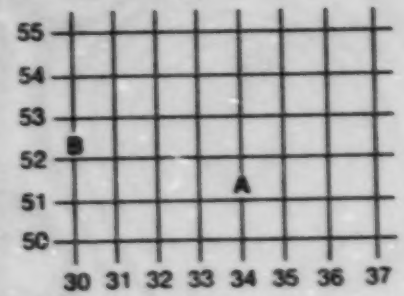
Content	Details on the Content	Suggested Teaching/Learning Activities
Graphic or linear scale	To find the area of an irregular surface (a park, a wooded area, etc.), it is recommended that a millimeter squared sheet of paper be superimposed on the map. Remember that in the case of a verbal scale map length is indicated before ground length. Example: 1 cm represents 1 m. The scale of a map can be represented graphically by means of a line subdivided into numbered sections, each section standing for a measurement unit. Such a scale is referred to as a grahic or linear scale. For more accurate calculations it is customary to use the subdivisions of the section to the left of the one which represents the first unit (to the left of the 0). That section is commonly know as the talon of the scale. Curved or irregular lines can be measured by laying a piece of thread or a strip of paper along the line being measured. It is then a simple matter of transfering the length of the thread or strip of paper to the linear scale to determine the distance between the end points.	2.10 Using the verbal scale of a map: (a) Find the surface area represented by the map. (b) Find the area of a lake or forest. 3. Teach the pupil how to turn a verbal scale into a graphic scale. 3.1 Draw a graphic scale for each of the following statements: (a) 1 cm represents 10 m; (b) 2 cm represents 100 km. 3.2 Use the graphic scale of a map to estimate the distance between two points. (Calculations are made without using the talon of the scale). 3.3 Use the graphic scale to measure precise distances between two points. (Calculations are made using the talon of the scale). 3.4 Use the graphic scale to measure the length of a river or curved or irregular distances. 3.5 On a city map find the distance between different places. (a) along a straight route, (b) along an irregular route. 3.6 Find the distance between Gaspé and Montreal on a map of Québec. 3.7 Find the distance between Halifax and Vancouver on a map of Canada: (a) along a straight route; (b) along the Trans-Canada Highway.

Content	Details on the Content	Suggested Teaching/Learning Activities
• Fractional or numerical scale	• A map scale is sometimes indicated by means of a fraction. For instance, 1:50 000 means that a measurement unit on the map corresponds to 50 000 times that unit on the ground. The choice of the measurement unit is at the user's discretion. Thus in the preceding example, the scale can be expressed either in centimeters or in meters: 1 cm represents 50 000 cm, or 1 m represents 50 000 m.	• 4. Teach the pupil how to interpret a fractional or numerical scale. 4.1 Returning to Activities 2.1 and 2.2, express the scales in fractional form. 4.2 Convert verbal scales into fractional scales. 4.3 Calculate distances on a map using its fractional scale. 4.4 Indicate whether different fractional scales are "large" or "small." Example: 1:500, 1:1 500, 1:25 000, 1:250 000. large ⟷ small 5. *Synthesizing Activities* 5.1 Do a display of maps with different scales to cover a given surface area. 5.2 Illustrate the different types of scales.

• Enrichment activity

UNIT 3.2	**Terminal Objective: 3.2 To use the principal components of maps.**	
	Intermediate Objectives: 3.2.3 To use different types of coordinates.	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
Geographical coordinates	The geographical coordinates studied in Unit 2.1 are reviewed in this objective. The intention here is to teach the pupil how to use them for reading maps. The pupil should be able to identify the cardinal points by observing the arrangement of the figures in the grid: – the figures increase upward: North Latitude; – the figures increase downward: South Latitude; – the figures increase to the right: East Longitude; – the figures increase to the left: West Longitude.	1. Review the concepts and ideas pertaining to geographical coordinates. 1.1 Find the geographical coordinates of a number of places. 1.2 Identify what can be found from given geographical coordinates. 1.3 Find the cardinal points corresponding to the following geographical coordinates: A 32° 31° 30° = E Longitude N Latitude 25° 26° 27° 28° 29° 30° B 45° 40° 35° = W Longitude N Latitude 170° 165° 160° 155° 150°

Content	Details on the Content	Suggested Teaching/Learning Activities
		
Index grid	The pupil was introduced to the use of the index grid in the learning activities for Objective 2.1.3. It is advisable at this point to use maps with such a grid reference system to have the pupil locate different places.	2. Place an index grid over the picture of a landscape or a neighborhood plan to locate a particular point.  Example: The house is located at 3C.
	To make it easier to locate places on road maps, city plans, and tourist maps, a type of grid is used generally in association with an index.	3. Use the grid reference system of a road map, city plan, or tourist map, to locate different places.

Content	Details on the Content	Suggested Teaching/Learning Activities
Topographic coordinates	The location system of topographic maps is based on the concept of coordinates. It is advisable to associate the vertical lines with the concepts of meridian and longitude, and the horizontal lines with those of parallel and latitude. By convention, the figures referring to the vertical lines are always placed first. Thus, when stating the topographic coordinates of a place the longitude is given first and the latitude next. It is possible to locate a point by means of four-figure coordinates.	4. Give the location of points A and C on this numerical grid: *How to proceed:* – Find the *vertical* to the immediate left of point A (Vertical 74); – Find the *horizontal* immediately below point A (Horizontal 33); – Point A is located at coordinates 7433; – Point C is located at coordinates 7332.  5. Construct a numerical reference grid.  5.1 Draw a school (A) at 3451. 5.2 Place a church (B) at 3052. 5.3 Locate the following points on the grid: 3352 3054 3551

Content	Details on the Content	Suggested Teaching/Learning Activities
	• To determine position with greater accuracy, six-figure coordinates should be used. The interval between two lines is subdivided into ten sections and the approximate position of the point is expressed as follows: – Vertical line: 30.5 = 305 – Horizontal line: 22.2 = 222 – Total coordinates: 305222 • It is not necessary at this point to explain the quite complex national grid reference system used on maps. Instructional emphasis should be on the use of these lines to find and locate places.	• 5.4 Locate the following points on the grid: 335525 352518 319543 6. (a) Find what is located at given topographic coordinates on a topographic map. (b) Find the topographic coordinates of different places.

• Enrichment activity

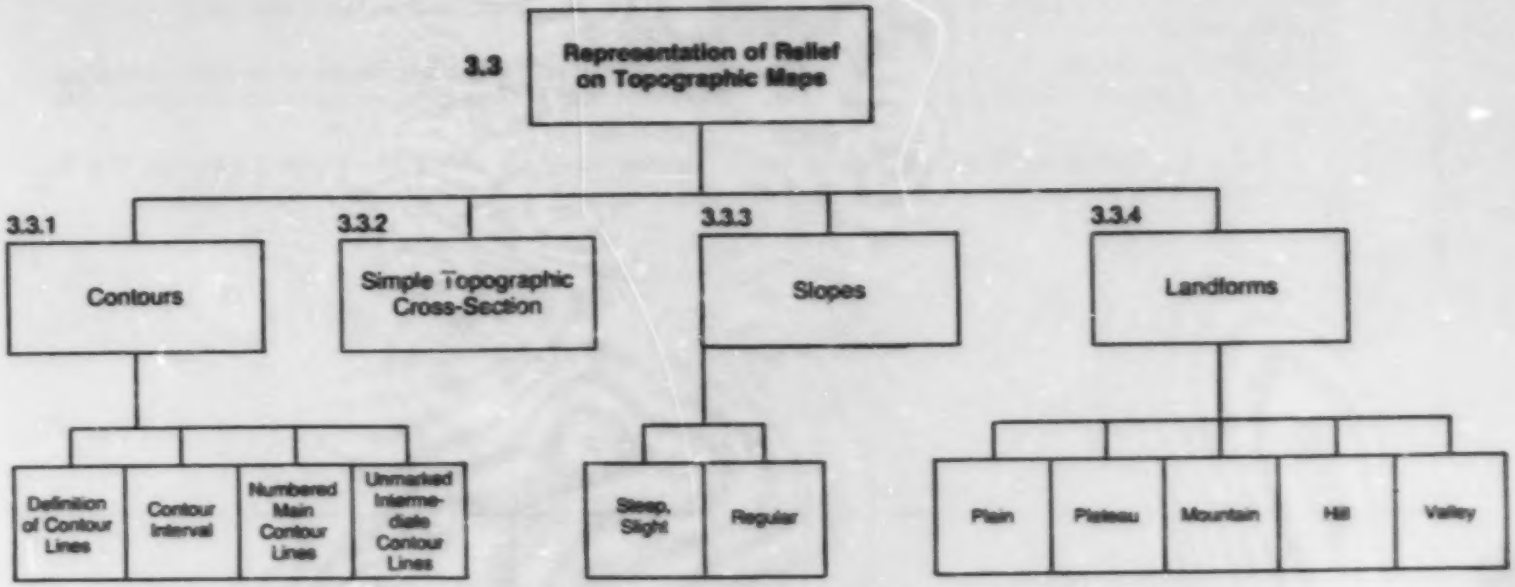
UNIT 3.3

Terminal Objective **3.3 To read the ways in which relief is shown on topographic maps.**

Intermediate Objectives:

3.3.1 To distinguish the characteristics of contours.
3.3.2 To draw a simple topographic cross-section.
3.3.3 To distinguish among principal types of slopes.
3.3.4 To distinguish among the principal landforms.

ORGANIZATION OF THE CONTENT



HOW TO TEACH UNIT 3.3

In the preceding units the pupil learned how to use such essential features of a map as its direction, system of symbols, scale, and location grid. In this unit the pupil will be introduced to the topographic map and will learn about the representation of the major relief features of a landscape on this type of map.

The first intermediate objective focuses on contours and related concepts and ideas which the pupil will have to be taught gradually. A number of concrete instructional activities are suggested in the Guide which are intended to facilitate the pupil's understanding of the nature of contours. The next step is to show the pupil how to establish and trace contours. At this point such concepts as main and intermediate contour lines, and contour interval (horizontal equivalent) should be explained to the pupil. The Guide contains a variety of exercises dealing with contours in relation to altitude which are designed to help the pupil discover how the arrangement of a set of contours can represent slopes and landforms.

To complete the study of the topographic map the unit introduces the pupil to topographic cross-sections. It is important that the pupil has a good grasp of the idea of cross-section before it can be applied to contours. Once he becomes familiar with the concept, he should find it easier to draw a topographic cross-section. It is important above all to proceed gradually. It is easier to draw a topographic cross-section from a drawing of imaginary contours than from a topographic map. The first contour lines could represent simple landforms such as a hill. Later on, the pupil might be asked to deal with more complex landforms, a plain, for example. Finally, at the very end, when the pupil has acquired a sufficient mastery of the first two stages, he should be able to handle precise cross-sections on the topographic map.

To enable the pupil to *read the relief forms* represented on topographic maps he should be taught, by means of appropriate exercises, to associate different types of slopes and simple landforms with the general arrangement of the contour lines on the map.

Note: The *User's Guide to the Topographic Map of Beloeil* is suggested as instructional aid for Units 3.3 and 3.4. See the Appendix to the Guide on page. . .

UNIT 3.3	**Terminal Objective: 3.3 To read the ways in which relief is shown on topographic maps.**	
	Intermediate Objectives: 3.3.1 To distinguish the characteristics of contours.	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
Hypsometric maps Topographic maps Contours	In the preceding modules the pupil learned to identify the principal relief features of the planet (2.2.1). He should by now be familiar with one of the different methods used to represent relief on wall and atlas maps, namely, hypsometric tinting and layer coloring. It is not necessary to emphasize hachures and hill shading as these methods are very rarely used today to show relief. The course focuses on *contours* because this is the most accurate method for representing three-dimensional ground surface by two-dimensional means. The pupil should first be made aware of the difficulties involved in transposing different landforms onto a plane surface (See Activity 2.1, Experiment B). Since this representation technique is characteristic of topographic maps in general, the basic instructional tool in this unit will be the topographic map.	1. Observe how relief is represented on hypsometric maps and on topographic maps. 2. Explain the technique of contours to the pupil. 2.1 *Experiment A:* Look at a number of objects of different shapes (conic, round, etc.) "from above" and reproduce them on a plane surface. 2.2 *Experiment B:* Take one half of a big potato or a pear. Cut it in about five slices of equal thickness. Draw the contour of the largest slice on a sheet of paper, then the contour of the next slice inside the drawing, and so on to the smallest slice. The entire drawing represents the *contour lines of the potato*. Observe the arrangement of the contour lines when the object has a steeper side. Measure the height of the object and determine the respective height of each slice. 2.3 *Experiment C:* Place a rock in a tub. Pour water into the tub up to a height of 2 cm. Mark the water level on the rock with a piece of chalk. Pour in 2 cm of water and mark the new water level. Proceed in the same manner until the rock is entirely under water. Take the rock out of the water and look at it from above. The water level marks correspond to the *contour lines of the rock*. Notice that the vertical distance between the lines varies according to the shape of the rock. Make the connection between slope angle and contour interval when the lines are seen from above. Number each line in accordance with its particular height: 2 cm, 4 cm, etc. Note that the vertical distance between adjacent contours is called *vertical interval*.

Content	Details on the Content	Suggested Teaching/Learning Activities
Contour interval Contours Altitude (height) Elevation Mean sea-level Topographical survey Spot heights Bench marks	The idea of contour interval or vertical interval is an important one and the pupil needs to understand it before he can deal with contours. The contour interval is the vertical distance between adjacent contours which remains constant. Contour lines are lines that join places of equal altitude above mean sea-level. It is not necessary here to explain in detail the triangulation method used in topographic surveys. It might be pointed out to the pupil, however, that it is necessary to know the exact height of a number of spots before the contour lines can be drawn. Spot heights, bench marks in particular, are accurate points of reference defined and located by the surveyor in order to calculate the exact height above mean sea-level of a place or relief feature.	2.4 *Experiment D:* Draw the contours of an imaginary relief feature on tracing paper. Reproduce each contour separately on corrugated cardboard or styrofoam. Cut out the contours and stack them up so as to reproduce the original drawing. Make observations concerning contour interval and vertical distance. 3. Explain how contours are determined. 3.1 Define the expression "mean sea-level." 3.2 Define altitude (height). 3.3 Distinguish between the absolute altitude and the relative altitude of a place. 3.4 Define spot heights and bench marks.

Content	Details on the Content	Suggested Teaching/Learning Activities
	• The pupil should be made aware that much care should be taken to draw contour lines at the right place between two spot heights. For example, the contour line at spot height 100, between spot heights 180 and 175, should be drawn closer to 75 than to 180. Contour heights can be indicated by a number on the line or slightly above the line. Spot heights appear only on maps whereas bench marks are indicated both on topographic maps and in the field (on walls, poles, cement slabs, etc.). They are identified as follows: BM 33,00 (Bench Mark 33 feet) or BM El. 10,00 (Bench Mark 10 metres above mean sea-level).	• 4. Draw a pattern of contours, given a network of spot heights. 4.1 Join all spot heights of the same elevation, using a pre-established contour interval. 4.2 Show the height of each contour on the corresponding line. 5. Given a network of spot heights, draw a contour pattern using various contour intervals. Use color layering to show the relief. 6. Make the distinction between spot heights and bench marks. 6.1 Find a spot height and a bench mark on a topographic map. Tell what these symbols mean. 6.2 Find a bench mark in your neighborhood. What does it indicate?

• Enrichment activity

Content	Details on the Content	Suggested Teaching/Learning Activities
Main contour lines Intermediate contour lines	The pupil should realize that the main contour lines make it possible to locate a spot and calculate its altitude quickly, whereas the intermediate contour lines are used to determine elevation with greater accuracy. Note: All these exercises can be carried out using graphics constructed by the teacher or by the pupils with the teacher's help. Appropriate topographic maps can also be used.	7. Find out the function of the main contour lines on a topographic map. 7.1 Distinguish the main contour lines from the intermediate contour lines on a topographic map. 7.2 Find the elevation of different points on the map, using the two types of contour lines. 8. Ask the pupils a variety of questions which require him to relate the concepts of *altitude (elevation)* and *contour*. Suggestions: 8.1 You're walking along a winding road. Are you climbing or descending? 8.2 What should you do to gain or lose altitude? 8.3 Given the vertical distance separating the contour lines, determine your altitude gain or loss when you move from one contour to another. 8.4 How can the arrangement of the contours represent a steep slope or a gentle slope? 8.5 How can you know whether you're climbing or descending by observing the contour lines?

UNIT 3.3	**Terminal Objective: 3.3 To read the ways in which relief is shown on topographic maps.**	
	Intermediate Objectives: 3.3.2 To draw a simple topographic cross-section.	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
Cross-section Cross-profile	It should be pointed out that the cross-sections or sketches shown in Activities 1 and 2 will not be very *accurate*. They are being suggested simply to enable the pupil to understand the concepts of cross-section and cross-profile through observation.	1. Help the pupil to understand the concept of cross-section. 1.1 Cut a potato or a pear lengthwise. Notice that the profile shows both bulges and dips. 1.2 Draw the profile as seen. 1.3 Suggested experiment: 1. Arrange a number of objects of different heights on the ground (a trash can, a globe, a pile of books, etc.). Cover them up with a strip of tissue paper. 2. Extend a rope horizontally a few feet above these objects. This rope is intended to serve as a base line. 3. Measure the (vertical) distance between the base line and each of the objects on the ground, using a plumb line graduated into a number of units. 4. Construct a table to record the data collected, placing on one side the horizontal distances measured on the base line, and on the other side the vertical distances measured on the plumb line. 5. Transfer these data from the table to a sheet of squared paper, using an appropriate scale: (a) A base line representing the stretched rope (Step 2) and numbered into measurement units, starting at 0. (b) A number of dots, each of which indicates the position of an object (Step 3). 6. Join the dots so as to reproduce the curve of a strip of paper thrown over the objects.

Content	Details on the Content	Suggested Teaching/Learning Activities
	For these activities, it is advisable to deal only with simple relief forms such as a cone-shaped hill with a steep side. The sketches can be drawn on paper or on transparencies.	2. Have the pupils draw a variety of topographic sketches based on different contour patterns. 2.1 Associate a number of sketches of simple relief forms with the sketches of their corresponding contour patterns. 2.2 Draw the contours which correspond to various sketches of simple relief forms.
Topographic cross-section	A precise topographic cross-section makes it possible to obtain a more accurate and realistic profile. However, it is advisable at the beginning to have the pupil draw topographic cross-sections from sketches of contours. He will learn to work from topographic maps in due time.	3. Draw a precise topographic cross-section based on a sketch of a contour pattern. *Suggested procedure:* *Step 1:* Draw a line XY across all the contours and through their apexes. *Step 2:* Prepare the following diagram on a sheet of squared paper: – Draw a horizontal line X'Y' of the same length as the line XY. X'Y' will be the base line of the cross-section. – Draw a vertical line which will provide a scale for representing the elevation. The vertical scale should include every one of the contours that are to be represented.
	Even though the cross-section is *true* only when the horizontal scale is identical with the vertical scale, it is generally recommended that the vertical scale be exaggerated 5 to 6 times. A greater exaggeration would cause too great a deviation from reality. On the other hand, without vertical exaggeration the height of the resulting profile might be insignificant, especially for low altitude relief forms.	

Content	Details on the Content	Suggested Teaching/Learning Activities
	It is not necessary at this stage to explain in detail what *vertical exaggeration* is or to have the pupil calculate it. However, the pupil should be made aware of the possible results of excessive vertical exaggeration.	*Step 3:* Place the straight edge of a strip of paper along line XY. Mark points X and Y on the strip and then the points where the line crosses the contours. Write down the elevation of each contour under the appropriate point. *Step 4:* Place the strip of paper along the horizontal base line X'Y'. Raise the strip at a perpendicular angle with the vertical scale up to the elevation indicated by the point on the strip and mark that elevation with a dot on the squared paper. Draw a curve to join all these dots. The result is a cross-section.
	Selection of map sections in which simple relief forms are represented is recommended.	4. Draw topographic cross-sections on a topographic map.

UNIT 3.3	**Terminal Objective: 3.3 To read the ways in which relief is shown on topographic maps.**	
	Intermediate Objectives: 3.3.3 To distinguish among the principal types of slopes. 3.3.4 To distinguish among the principal landforms.	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
Highlands Lowlands	It might be pointed out that the arrangement of contours varies according to the type of relief. Contours that are crowded together represent mountains, whereas those that are far apart represent plains and plateaus, regions of fairly level surfaces. The pupil should pay attention to the spot heights recorded on the contour lines.	1. Sensitize the pupil to the three-dimensional nature of relief forms by teaching him to make scale models and to use a stereo viewer to examine photographs. 2. Teach the pupil to associate the general aspect of relief forms with the general arrangement of contours. 2.1 Examine the arrangement of contours on different topographic maps. Select both mountain regions and lowland regions. 2.2 Draw different topographic cross-sections on a map for both mountain regions and lowlands. 2.3 Examine the contours on a topographic map and identify the areas where the land rises and those where it slopes downward.
Slopes Steep slopes Gentle slopes	The pupils should remember that closely spaced contours represent a steep slope whereas widely spaced contours indicate a gentle slope. It is not necessary at this point to deal with the concept of gradient.	3. Teach the pupil to associate the main types of slopes with the arrangement of contours. 3.1 Review the experiments B and C carried out in Activity 2 within the framework of Objective 3.3.1 (p. 79). Compare the contour patterns of the potato and the pear with the respective shapes of these objects. 3.2 Go back to the topographic sketches drawn in Activity 2 under Objective 3.3.2 (p. 84). Compare the contour patterns with the corresponding relief forms. 3.3 Go back to the topographic cross-sections done in Activities 3 and 4 under Objective 3.3.2 (pp. 84 and 85). Compare the contour patterns with the profiles that have been obtained.

Content	Details on the Content	Suggested Teaching/Learning Activities
Uniform slopes	On a topographic map a regular (uniform) slope is indicated by evenly spaced contour lines. It is not necessary at this point to focus on the concepts of concave and convex slopes.	3.4 Examine the picture of a relief with a uniform slope on one side and an irregular slope on the other. 3.5 Examine the topographic cross-section of a relief form with a uniform slope on one side and an irregular slope on the other. 3.6 Give a variety of pictures of relief forms and topographic cross-sections, identify the steep slopes and the uniform slopes.
Hills	*Hills* are indicated on topographic maps by almost circular contour lines. Their elevation is generally less than 600 m.	4. Teach the pupil to associate different landforms with different contour patterns. 4.1 Give a brief description of the general aspect of the regions represented on different sections of a topographic map. Identify the highest elevation in each region, the steep slopes, and the gentle slopes. It is advisable to select a variety of relief forms for this activity.
Mountains	*Mountains* are represented by similar contour lines, but their elevation is generally much higher.	4.2 Check the accuracy of the observations made in Activity 2.1 by doing a topographic cross-section of these regions.
Valleys	*Valleys* are low-altitude landforms often found between two mountains. They are represented by "V" shaped, elongated contour lines which are more or less closely spaced depending on the slope of the mountain sides. A stream or a river usually runs at the bottom of a valley.	4.3 Compare the relief of these regions on the basis of the data obtained in Activities 2.1 and 2.2.
Slopes		
Plateaus	*Plateaus* are uplands with a fairly level surface. They are represented by contour lines that are widely spaced at the center and more closely spaced toward the edge.	

Content	Details on the Content	Suggested Teaching/Learning Activities
Plains	*Plains and lowlands* are represented by irregular, widely spaced, and meandering contour lines.	5. Draw a contour map based on the description of a given landscape. Note: It is advisable to describe simple relief forms or a region with a relatively simple relief. Examples of description of relief: (a) A flood plain east of a region that gradually rises up to an elevation of 9000 m (contour interval: 1000 m). (b) A mountain range of an average elevation of 6000 m which crosses a region diagonally and which has a steep slope on its northwest side and a gentle slope on its southeast side (contour interval: 500 m). • (c) A valley at the bottom of which runs a 10 km long river whose source is more than 1800 m above mean sea-level (Scale 1 cm = 1 km; Contour interval: 300 m).

• Enrichment activity

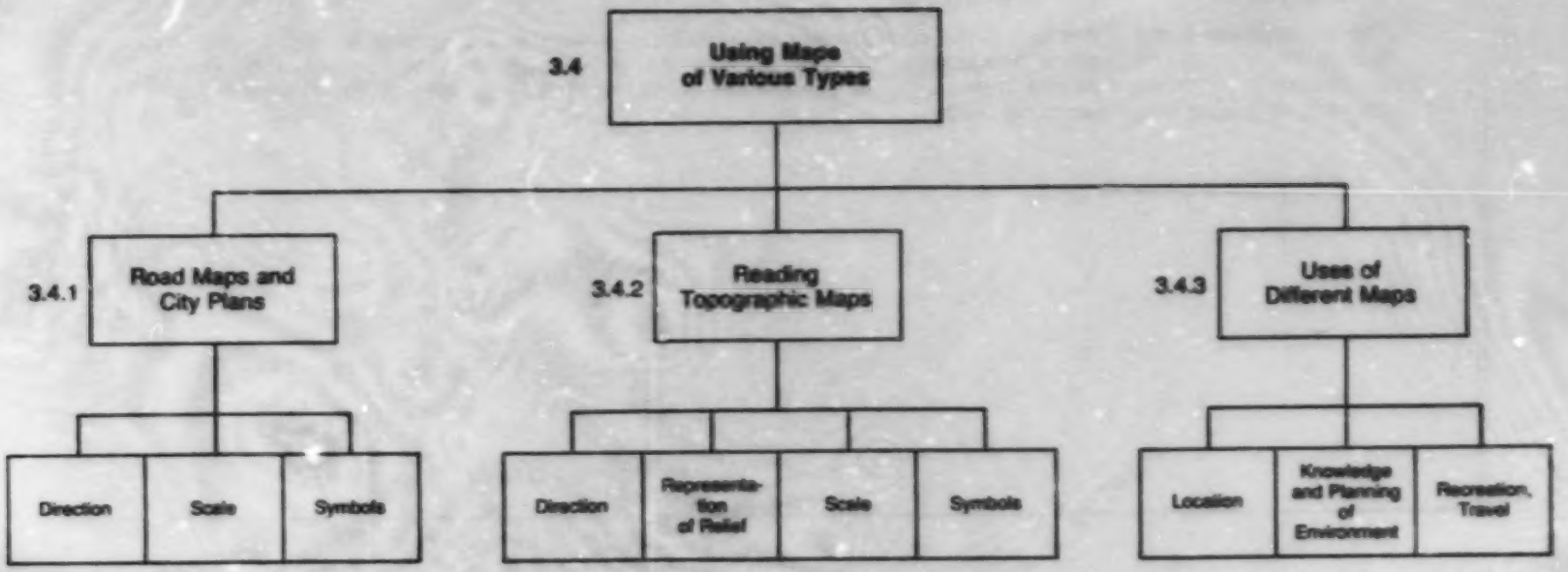
UNIT 3.4

Terminal Objective **3.4 To use maps of various types.**

Intermediate Objectives:

3.4.1 To use the road map and the city plan.
3.4.2 To read a topographic map.
3.4.2 To show the usefulness of topographic maps, road maps, and city plans.

ORGANIZATION OF THE CONTENT



HOW TO TEACH UNIT 3.4

This unit may not have to be taught formally at the end of the module, as its content has already been covered through the preceding units. As was suggested earlier, these earlier units require the use of several different types of maps for different purposes. For Unit 3.1 it was recommended that one or more maps be used to teach the pupil to find direction. In Unit 3.2, the intention was to familiarize the pupil with the elements of maps in general, while in Unit 3.3 the focus of study was the topographic map.

In case the teacher has opted to proceed differently and has overlooked road maps and city plans in teaching these units, he will find here a number of exercises which cover different aspects of cartography. If the topographic map was not studied in Objective 3.3.4, the teacher now has the opportunity to show the pupil how to read such maps. The idea is to bring the pupil to express concisely and clearly what he has learned by examining the contour patterns on a topographic map. It is by actually drawing contours that the pupil will learn to recognize relief forms and to describe them in his own words. However, the pupil needs the teacher's guidance during the first map reading exercises, and he should be given a model to follow. At this point, the pupil is not expected to submit an elaborate report. In any case, this objective will be covered again in Secondary III.

The last objective of this unit is to help the pupil discover the usefulness of maps in a number of fields. Ultimately, this module should enable the pupil not only to master the concepts, facts, and skills pertaining to cartography, but also to apply the knowledge he has acquired and, in the process, to discover how useful maps are. This is the purpose of the synthesizing activities suggested in this part of the Guide.

UNIT 3.4	**Terminal Objective: 3.4 To use maps of various types.**	
	Intermediate Objectives: 3.4.1 To use the road map and the city plan.	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
Road maps Insets Compass card Index and coordinates	Road maps give detailed information on the road network. Before involving the pupil in learning activities with the Québec road map, it is advisable to explain the make-up of the map and to show him how to handle it. The following should be explained to the pupil: – the technique for folding and unfolding a map, – the insets and divisions of a map, – the conventional signs, – the meaning of the colors used, – the variety of type sets, – the information found on the map, – the use for this type of map.	*The Road Map* 1. Study of a road map. Suggestions: The Québec road map and the *User's Guide to the Road Map* (16-4299A). 2. Learn the right technique for folding and unfolding a road map. 3. Identify on a Québec map the area of the province covered by the road map. Find out why the northern part of the province has not been mapped. 4. Identify the insets of the map. 5. Find the drawing that indicates the orientation of the map. 6. Use the index and the grid to locate different cities. 7. Activities involving the use of the legend and conventional signs found on the road map.

Content	Details on the Content	Suggested Teaching/Learning Activities
Legend	A map legend explains the meaning of the colors and conventional signs used on the map. Highways are indicated by a number from 1 to 99 in a blue frame topped by a red line. They are also indicated in the legend.	*Colors* 7.1 Give the meaning of each of the colors used. *Roads* 7.2 Identify two ways of recognizing a highway. 7.3 What are the symbols used to represent the following: a highway with tool booths, a highway under construction, a divided highway, an unpaved road, etc.? Give an example in each case. 7.4 Find Highway 40. What kind of road is it? 7.5 Which highway goes north the furthest? Which highways go to the United States and to Ontario? *Borders* 7.6 What are the symbols used to indicate the United States border and the Québec-Ontario border? 7.7 Identify the Canadian provinces which share common borders with Québec. 7.8 Identify the river that serves as the border between Québec and Ontario. *Services* 7.9 Follow the C.N. and C.P. railroad lines. 7.10 Identify public ferry stations on the St-Lawrence river. 7.11 Identify the cities of Québec that have an airport. 7.12 Identify the provincial parks with camping areas. 7.13 What kind of camping is Mont-Tremblant Park best suited for? 7.14 Identify the symbols used for rest areas along highways and for tourist information centers. 7.15 Identify the means of transportation that is the most widespread on the North Shore. 7.16 Identify the bridges that link Montreal and the south shore of the St-Lawrence.

Content	Details on the Content	Suggested Teaching/Learning Activities
		Cities and Towns 7.17 Find the cities with a population of more than 35 000. 7.18 Give the estimated population of the following towns: Joliette, St-Georges, etc. 7.19 Identify the northernmost, southernmost, easternmost, and westernmost town or village. 7.20 Name the most important town or city in the southwest, northwest, southeast, and northeast regions of Québec. 7.21 Give the location of your town in relation to other towns. Example: Rivière-du-Loup is located northeast of Montreal and southeast of Rimouski. 7.22 Name the Ontario city that is closest to Hull. 7.23 What is the point of entry into the United States that is closest to Montreal?
Table of distances	The distance between two cities A and B can be found by following the column for A downward and the column for B horizontally until you find the number of kilometers in the rectangle formed by the crossing of the two columns. Distances between cities are indicated in red. To find out the distance between two cities located far apart from each other, you just add all the distances indicated between these two cities.	8. Activities involving the use of the table of distances: 8.1 Find the distance between different cities, using the distance table. 8.2 Find the shortest route from Québec City to Sherbrooke. 8.3 Calculate how long it takes to go from Chicoutimi to Montreal at an average speed of 90 km per hour. 8.4 Calculate the distance between two cities, using the figures that appear in red between the cities.

Content	Details on the Content	Suggested Teaching/Learning Activities
Graphic scale	As the pupil has already learned how to use graphic scales (Unit 3.2), the exercises suggested here offer him an opportunity to review the subject.	9. Exercises on the use of graphic scales: 9.1 Find the distance between different cities using the graphic scale. 9.2 Calculate how long it would take to swim from Lake St-Jean de Péribonka to Desbiens at an average speed of x km per hour. 9.3 Calculate how long it would take for a boat to go from Montmagny to Île-aux-Coudres at an average speed of 25 km per hour. 9.4 Calculate how long it would take to go from Drummondville to Sherbrooke at an average speed of 80 km per hour.
	These questions will elicit different answers. However, by observing the network of roads and the development of urban communities in the region, the pupil should be able to formulate a number of hypotheses.	10. Discuss these problems: 10.1 Are roads constructed to link cities and villages, or do cities and villages develop at crossroads?
		11. Draw a circle around your locality to show the radius within which you can travel in an hour.
	This activity could be carried out in teams, each team being responsible for a circle or a quadrant.	12. Draw five concentric circles around your locality with radii of 20 km, 40 km, 60 km, 80 km, and 100 km respectively. Identify the localities found within each circle and describe some of them.
		13. Plan a trip from one city to another.
		14. Plan a rally on the road map.

Content	Details on the Content	Suggested Teaching/Learning Activities
City plans Land use Sector Neighborhood	A city plan represents the streets and main buildings of a city or municipality and illustrates land use within this geographical area. City plans are covered in elementary school as well as in the preceding modules. The activities suggested here are intended to give the pupil the opportunity to complete his study of city plans. Each team might focus on various aspects of a particular neighborhood: housing, services, quality of life, etc.	*City Plans* 15. Exercises pertaining to orientation, directions, streets and main thoroughfares. 15.1 Trace the route you would follow in the course of a day to travel from home to school, to the sports center, etc. 15.2 Plan the shortest route for a cicycle trip to the other end of town. 15.3 Plan the route you would follow to go across town walking and using public transportation. 15.4 Trace the different school bus routes. 16. Exercises concerning land use: 16.1 Distinguish the location of the following on a city plan: residential areas, shopping centers, industrial areas, recreational areas, green spaces. 16.2 Locate your home on the city plan and mark its location with a dot. Draw a circle around that dot. The radius of the circle is equivalent to 1 km. Identify all the places less than 1 km from your home. 16.3 Explore and study different city neighborhoods in teams.

UNIT 3.4	**Terminal Objective: 3.4 To use maps of various types.**	
	Intermediate Objectives: 3.4.2 To read a topographic map.	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
Features of a topographic map	The basic features of the topographic map have been explained in the preceding units. The teacher should use appropriate exercises to review these features.	1. Study of a topographic map. Suggestions: The Topographic Map of Beloeil (31 H 11-200-0102). See the Appendix to the Guide, p. 245.
Oral or written description	The detailed study of one or more topographic maps makes it possible to select important features which can be described briefly, orally or in writting. The pupil should use a precise terminology in his descriptions.	2. Select a road of reasonable length that crosses a section of a topographic map: 2.1 Situate this road in relation to the map. 2.2 In what direction does the road run? 2.3 How long is the road? 2.4 What cities does it link? 2.5 Describe the major characteristics of the region it crosses. 2.6 Describe the symbols which represent these characteristics. 3. Give a brief description of the general aspect and specific characteristics of the region represented on the map.

UNIT 3.4	**Terminal Objective: 3.4 To use maps of various types.**	
	Intermediate Objectives: 3.4.3 To show the usefulness of topographic maps, road maps, and city plans.	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
Uses of different maps	The pupil is more likely to discover the uses to which geographic maps can be put through appropriate exercises than through long theoretical discussions of the subject. He will realize that maps are effective and easy to handle tools if, for instance, he actually uses one to plan a recreational activity, or observes how they are used in different fields.	1. Use maps to locate places. *A Discovery Trip Through Québec* 1.1 Make a list of a number of places the pupils can visit from their hometown. 1.2 Using a road map, plan a possible route and indicate the appropriate roads to take. 1.3 Using various publications, describe the characteristics and tourist attractions of the towns to be visited. 2. Use a city plan to find out how the land is used within the city. 2.1 Divide the class into small groups and assign a section of the city plan to each group. 2.2 Using an aerial photograph and the corresponding city plan, reproduce on a transparency the principal features found in the section under observation: roads, buildings, parks, factories, farms, green spaces, etc. 2.3 Identify in the field the different features that have been isolated, using appropriate symbols. 2.4 Gather the information collected by each group to make up a wall map. Compare this map to a city plan.

Content	Details on the Content	Suggested Teaching/Learning Activities
		3. Use maps to plan a trip across Québec, Canada, or other countries. 4. Make a list of people who use maps for one reason or another. 5. Collect a number of different types of maps and use them to make a group wall collage. 6. Divide the maps that have been collected into different categories on the basis of their scale (small, average, large). 7. Classify these maps on the basis of their themes. 8. Examine a collection of old maps. 9. Write a summary description of the different uses of maps.

Module 4

ELEMENTS OF PHYSICAL GEOGRAPHY

MODULE 4

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INSTRUCTIONAL MATERIALS

Rock and mineral samples.
Pictures illustrating: the Earth's internal structure, faulting, folding, a volcano.
World maps representing: the structural groups, the climatic zones, the vegetation zones, the ocean and sea currents.
Map representing a basin and a hydrographic system.
Meteorological instruments: thermometer, rain gauge,* barometer,* anemometer,* weathervane,* hygrometer.*
Climatographs of different climates in various parts of the world.
Pictures illustrating vegetation zones and underwater relief.

MODULE 4

ELEMENTS OF PHYSICAL GEOGRAPHY

GENERAL OBJECTIVE: **UPON COMPLETION OF THIS MODULE, THE PUPIL SHOULD UNDERSTAND THE PRINCIPAL ELEMENTS OF THE NATURAL ENVIRONMENT.**

Terminal Objectives:

4.1 To describe the processes by which relief is formed.

*** 4.2 To describe the processes which change relief.**

4.3 To establish the links between climate and vegetation.

4.4 To show the importance of water on the Earth.

OVERVIEW OF MODULE 4

This module studies the main elements of physical geography. More specifically, it is concerned with the interactive relationships between the different components of the natural environment. To enable the pupil to reach this overall understanding of the Earth, the contents of the four units in this module interlock and follow a certain progression. In the first unit the pupil studies the formation of the Earth's relief, focusing on the planet's internal structure and the constructive forces at work in the process, whereas in the next unit he examines the processes which change relief. The third unit is concerned with climate and vegetation, while the last unit shows the importance of water on the Earth.

The instructional methods suggested for this module are designed to facilitate the pupil's understanding of the different concepts pertaining to physical geography. To help the pupil understand these concepts, several experiments are suggested in the Guide. It is also recommended that maps and sketches be used to concretize the different concepts and ideas the pupil has to deal with. In addition, the instructional methods suggested should make the pupil aware of the connections between these different concepts and ideas. In this module some objectives will thus be taught as part of different sets. What is important is to see the contents of the module not as fragments but as a whole.

* Objectives marked with an asterisk are optional.

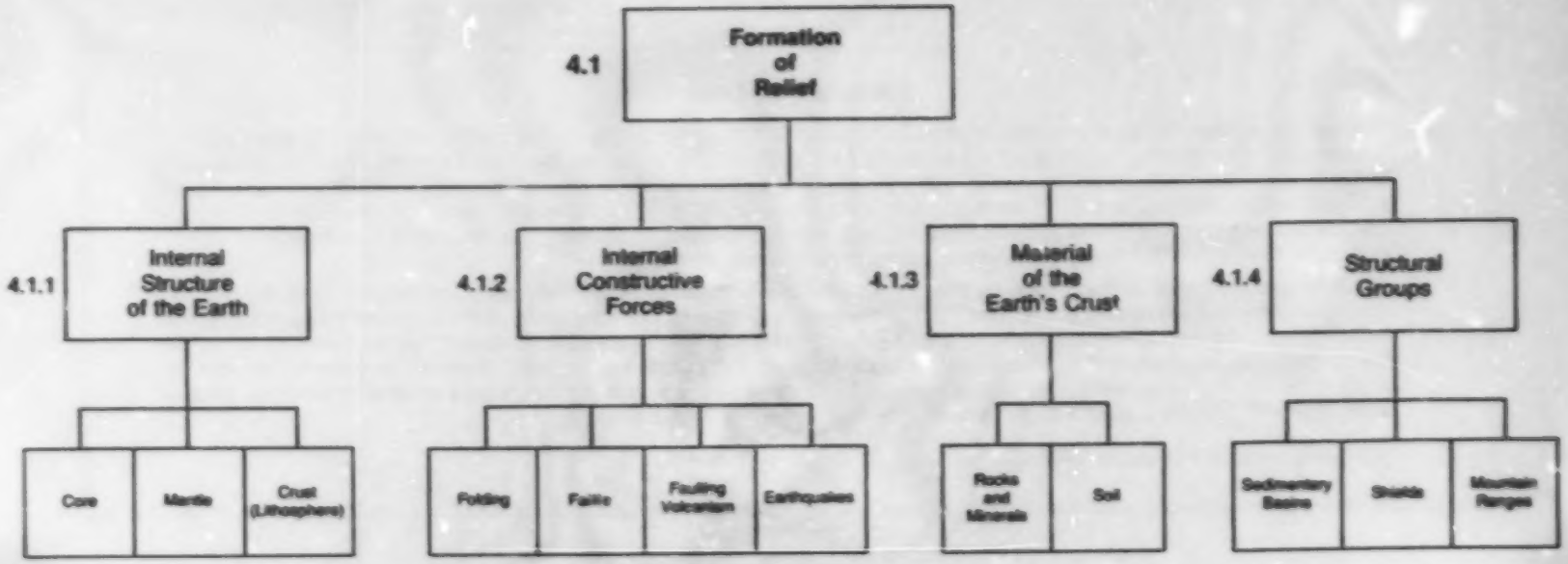
Unit 4.1

Terminal Objective **4.1 To describe the processes by which relief is formed.**

Intermediate Objectives:

4.1.1 To name the zones of the Earth's internal structure.
4.1.2 To distinguish among the principal types of internal constructive forces.
4.1.3 To identify the different materials which form the Earth's crust.
4.1.4 To distinguish among the main structural groups.

ORGANIZATION OF THE CONTENT



HOW TO TEACH UNIT 4.1

Upon completing this unit the pupil should understand that existing landforms develop as the result of a long process in which a variety of constructive forces act upon the internal structure of the Earth. In connection with the first objective, a brief description of the planet's internal structure is given. According to the generally accepted theory, the Earth's interior is composed of three main layers: the core, the mantle, and the crust. While interplanetary travel is today a reality, exploration of the center of the Earth is still in the far distant future, for to date only an infinitesimal part of the surface layer of the planet has been studied first hand. The second objective focuses on the constructive forces which originate from within the internal structure of the planet. In a simple way, this objective covers the effect of the tectonic forces on the continental blocks (folding, faulting, volcanism) which build relief. The third objective is concerned with the materials of the Earth's crust or lithosphere (rocks and soil). The pupil learns to distinguish the two types of rocks found on the Earth's surface on the basis of their origin (igneous rocks and sedimentary rocks). He also learns about soil, a mixture, and organic matter, which results from the erosion of rocks and the decay of plants and animals.

These three objectives lead gradually to the study of the major structural units of the planet: the shields, the sedimentary basins, and the mountain ranges. While these basic landforms cannot be studied without refering to the concepts, facts, and ideas pertaining to the Earth's structure and internal forces, complicated explanations are to be avoided. It is suggested that maps be used to enable the pupil to associate the location of the structural units and that of the major landforms of the globe. In this way the pupil should be able to understand that the juxtaposition of the structural units delimits the continents and oceans distributed over the surface of the earth.

UNIT 4.1	**Terminal Objective: 4.1 To describe the processes by which relief is formed.**	
	Intermediate Objectives: 4.1.1 To name the zones of the Earth's internal structure.	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
Internal Structure Core Mantle Crust	The Earth is composed of a series of zones or spheres: the solid core, the liquid core, the mantle, and the crust or lithosphere. The crust or lithosphere is composed of two layers of different density and composition. The denser layer, composed mainly of basaltic rocks, forms the oceanic basins, and the lighter layer, made of granitic rocks for the most part, forms the continents.	1. Explain the Earth's internal structure. 1.1 Given the appropriate data, draw a sketch of the Earth's internal structure. Indicate the name, thickness or diameter, and composition of each zone or sphere. 1.2 Given a sketch of the component parts of the lithosphere, identify: (a) the continent and the oceanic basin, (b) the granitic layer and the basaltic layer, (c) the less dense layer. 1.3 Carry out the following experiments to help the pupil understand the concept of density: 1.3.1 Observe how a number of small wooden blocks float on water. 1.3.2 Observe the arrangement of several liquids of different densities in a glass container (water, oil, syrup, etc.).
Tectonic blocks or plates	The lithosphere is divided into blocks or plates which move on a layer of viscous materials.	2. Explain the composition of the lithosphere. 2.1 Identify the tectonic plates on a world map. 2.2 Carry out the following experiment to help the pupil understand the concept of fracture: – Boil an egg and let it cool – Break the shell. • 2.3 Using a world oceanographic map, identify and trace the tectonic plates and the land and undersea mountain ranges that are part of those plates or that border them.

• Enrichment activity

Content	Details on the Content	Suggested Teaching/Learning Activities
Convection currents	Within the mantle the heat causes the formation of convection currents, which are responsible for the movements of the tectonic plates.	3. Explain the dynamics of the tectonic plates. 3.1 Show the convection currents on the sketch illustrating the composition of the lithosphere (Activity 1.2). 3.2 Draw a series of arrows on the same sketch to identify the movements of the tectonic plates or to illustrate their separation. 3.3 Show a film pertinent to the subject and identify the action and effect of convection currents.
	• This experiment is designed to help the pupil: – understand convection; – understand that convection currents are responsible for the displacement of the tectonic plates.	• 4. Illustrate the action of convection currents by means of the following experiment: – Materials and equipment: a two-litre cooking pot, ice, water, and food coloring. – How to proceed: Put a dozen ice cubes in a container full of water. Touch the surface of the water with a hot rod. Add the food coloring at the point where the heated rod touches the water. Observe the direction in which the coloring moves. – Questions: – What causes the current? – What is the direction of the current? – Express the result of those observations in a sketch: 4.1 Draw the action of the current; indicate its direction. 4.2 Describe in one paragraph how scientists arrived at their conception of convection currents. (Personal investigation).

• Enrichment activity

Content	Details on the Content	Suggested Teaching/Learning Activities
		5. *Synthesizing* activities 5.1 Show a film in which the following are identified: the different parts of the Earth's internal structure, the components of the Earth's crust, the tectonic plates and their movements, proof of the theory of tectonic plates. Suggested film: *Continental Drift*, N.F.B. 5.2 Using maps that show the movement of the continents at different epochs (300 million, 50 million, and 1 million years ago), identify the following on each map: the continents, the tectonic plates, the direction in which the plates were moving.

UNIT 4.1	**Terminal Objective: 4.1 To describe the processes by which relief is formed.**	
	Intermediate Objectives: 4.1.2 To distinguish among the principal types of internal constructive forces.	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
Internal constructive forces Tension forces Pressure forces	Folding, faulting, and volcanism are the three main manifestations of the constructive forces at work within the Earth's structure. Folds and fractures are the results of the action of tension and/or pressure forces on different types of materials in the Earth's crust. These forces cause plastic materials to fold or to acquire new shapes, and rigid materials to break. The shock caused by a fracture is comparable to an earthquake.	1. Conduct a series of experiments to illustrate the effect of tension and pressure forces on different types of materials 1.1 *Experiment A* – Material: An elastic rubber strip. – How to proceed: Measure the length of the elastic strip. Stretch it to the maximum. Measure its length again. – Questions: Did the length of the strip change or did it remain the same? What kind of force caused the change? 1.2 *Experiment B* – Materials: Thin sticks of wood, plastic, and metal, a length of wire. – How to proceed: Place the stick of wood flat on the table with one section sticking out over the edge of the table. Hold the end on the table steady and try to bend the stick by pressing the other end with a constant force. Repeat the whole operation with the other materials. – Questions: What kinds of forces were used? Tension or pressure? What types of materials were involved? Plastic or rigid? What are the results? Fracture or fold? 1.3 *Experiment C* – Material: A thin wooden stick. – How to proceed: Hold each end of the stick with your hands. Use force to break the stick. Describe the feeling of shock in your hands and arms.

Content	Details on the Content	Suggested Teaching/Learning Activities
Folding	The plastic materials in the crust *fold*, producing ridges (anticlines) and troughs (synclines).	2. Explain and illustrate the effect of tension and pressure forces on plastic materials. 2.1 Experiment – Materials: A sheaf of paper. – How to proceed: Press against the two ends of the sheaf horizontally so as to obtain a corrugated surface (ridges and troughs). 2.2 After this experiment, draw a sketch of a fold, showing the anticline and the syncline. 2.3 Indicate the rock layers or strata in the sketch.
Strata	Folding usually occurs in rock masses arranged in layers or strata.	
Anticline Syncline	Models or pictures of relief forms make it possible to identify the anticline and the syncline in a fold.	3. Explain and illustrate the structure of a fold. 3.1 Using a geological model, identify the following features in a fold: the anticline, the syncline, the strata. 3.2 Using photographs of folds, identify the anticlines and the synclines.
• Stratification	Sedimentary rock layers are arranged in the order in which they were formed. The cross-section of a fold confirms this stratification.	•4. Explain and illustrate the arrangement of rock layers in a fold. 4.1 Build a pattern of folds, using colored modeling dough arranged in layers. Identify the anticline and the syncline. Cut through the anticline and the syncline, and compare the arrangement of the layers in each. Notice the sequence of older and newer layers. 4.2 Based on the preceding observations, draw a sketch illustrating the arrangement of the rock layers in the anticline and in the syncline. Identify the location of the older layers and of the newer layers.

Content	Details on the Content	Suggested Teaching/Learning Activities
	To give a concrete understanding of these concepts, an anticline should be identified with a hill, and a syncline with a valley. It might be worthwhile to point out the linear arrangement and concentration of human settlements in valleys.	4.3 Using an aerial photograph and/or a topographic map of the region, if possible, identify anticlines and synclines. Indicate the direction of these relief forms. 4.4 Examine the distribution of settlements and the spatial organization in the region represented in the aerial photograph or topographic map above (activity 4.3).
Faults	Rock masses can break or fracture under the action of a variety of stress forces. Movement along the line of fracture can result in a block of land being raised to create mountains or sinking to form trenches. • This activity is an opportunity to introduce the pupil to geological maps.	5. Explain and illustrate the effects of tension and pressure forces on rigid materials such as rock masses. 5.1 Simulate the movements that occur along a fault, using wood blocks or transparencies. Indicate the direction and nature of the movements. 5.2 Identify different types of movements along a fault, using sketches, transparencies, or photographs. Describe the effects of these movements on landforms and on human activity. 5.3 Draw sketches to illustrate a fault scarp, a fault line, and the deviation of the flow of a river due to faulting. • 5.4 Draw a cross-section of the St. Lawrence River Valley or the Saguenay Valley. Identify the faults and folds found in these regions. • 5.5 Identify faults and folds on a geological map or a topographic map of these regions. • 5.6 Locate a number of major faults on a world map. Examples: the San Andreas Fault, the African Rift Valley, the St. Lawrence River Valley.

• Enrichment activity

Content	Details on the Content	Suggested Teaching/Learning Activities
		6. *Assimilation Activities* 6.1 Show how faults and folds are formed, using a flat box full of sand. 6.2 Collect photographs of the locality or the region which show features due to folding and/or faulting. Name a number of criteria which make it possible to identify such movements.
	A fold will be identified by: – the presence of anticlines and synclines, – the alignment of the hills, – the parallel arrangement of the summits, – the presence of longitudinal valleys. A fault will be identified by: – the presence of a scarp, – the fault line, – the deviation of rivers and streams, – the presence of waterfalls.	
Volcanism Volcano Magma	A volcano is created when the magma erupts from inside the earth to the surface. Magma is molten rock in the earth's interior.	7. Describe an active volcano. 7.1 Construct a model of a volcano and simulate volcanic activity using ammonium dichromate. Observe the volcanic fallouts and discuss the potential problems that might arise due to the proximity of human settlements. 7.2 Draw a cross-section of a volcano and identify the following features: cone, pipe, crater, lava flow, emission of gases, volcanic ash, magma. 7.3 Show a film on volcanoes. Describe volcanic activity and identify some of its consequences for human settlement. 7.4 Collect newspaper and magazine articles about volcanism. 7.5 Using a table in which the latitude, longitude, and activity of a number of volcanoes, locate them on an oceonographic map of the world. Distinguish between active volcanoes, dormant volcanoes, extinct volcanoes, and undersea volcanoes.
	Volcanic eruptions occur on the edges of the tectonic plates.	

Content	Details on the Content	Suggested Teaching/Learning Activities
Volcano zone	The principal volcanic zones are: the Pacific Ring of Fire, the Mid-Atlantic Ridge, the Mediterranean. Point out that long-term predictions of volcanic activity cannot be made, but that short-term predictions are possible. An imminent volcanic eruption can be predicted by means of such instruments as the thermometer, the clinometer, and the seismograph. The thermometer is used to measure the rise in temperature of the earth as a result of the magma's upward flow. The clinometer is used to measure the deformation of the volcano under the pressure of rising magma. The seismograph is used to measure the magnitude of seismic waves.	7.6 Based on these data, identify the different volcano zones and notice their distribution on the edge of the tectonic plates. • 7.7 Using a statistical table of the eruptions of Mount Vesuvius, construct a scaled time line. Determine whether the eruptions are cyclical and whether it would be possible to make long-range predictions of their occurence. • 7.8 Given certain data and descriptions, identify a number of signs which indicate an imminent volcanic eruption. Consider the following problematic situations: – What kind of house would you build if you were living near a volcano? – What should you look at if you were a volcanologist? – What kind of measures would you take if you were the head of your family and you knew that a volcanic eruption in the vicinity was imminent?

• Enrichment activity

Content	Details on the Content	Suggested Teaching/Learning Activities
Earthquakes Earthquake Zones	Earthquakes are usually measured according to a scale called the Richter scale. Earthquakes can also be measured using the Mercalli scale which rates the visible effects of seismic vibrations. The world's earthquake zones are located, like the volcano zones, on the edges of the tectonic plates.	8. Describe an earthquake. 8.1 Collect a variety of photographs showing the results of earthquakes in certain areas of the world. Describe the kinds of damages caused by these earthquakes. • 8.2 Using the Mercalli scale, evaluate the kinds of damage caused by these earthquakes. 8.3 Using a table which gives the latitude, longitude, and description of major earthquakes, locate where these earthquakes occurred on an outline map of the world. Identify the earthquake zones and compare their distribution with that of the volcano zones. 8.4 *Problem* A case study of an earthquake of considerable magnitude (8+) in Morocco, Northern Italy, and Southern Italy. *Observations pertaining to:* – nature of damage; – types of houses and other buildings; – number of casualties; – effectiveness of disaster relief; – reconstruction. *Questions* – Were the houses and other structures built to resist earthquakes? – Was it possible to warn people before the earthquake? – Is the government aware that the region is earthquake prone? – Was the help extended to the victims effective? – Identify a number of problems related to disaster relief and reconstruction.

UNIT 4.1	**Terminal Objective: 4.1 To describe the processes by which relief is formed.**	
	Intermediate Objectives: 4.1.3 To identify the different materials which form the Earth's crust.	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
Igneous rocks	Igneous rocks are formed at high temperatures in the earth's interior. They result from the cooling and solidification of magma. There are two types of igneous rocks, each type being defined by the conditions and place of solidification. There are intrusive igneous rocks and extrusive igneous rocks.	1. Review the concepts and facts pertaining to volcanism. 1.1 Show a film or use photographs to review the different aspects of volcanic activity (Objective 4.1.2). Give a brief description of a volcanic eruption or draw an appropriate sketch. Identify the magma.
•Extrusive rocks •Crystallization •Texture Lava	•Extrusive rocks: When magma reaches the surface during an eruption, it becomes known as lava. The rapid cooling of the lava results in the formation of tightly interlocking crystals, which gives the rocks a fine grained texture. Basalt is a type of extrusive rock.	2. Describe the formation of intrusive and extrusive igneous rocks. 2.1 Describe lava in its flowing molten state, then, describe its surface when it has cooled. Indicate its color and shape. • 2.2 Using a variety of rock samples (basalt, obsidian, pumice, or lava from the region, if possible), identify the color and texture of the rock. 2.3 Investigate the different uses made of volcanic materials at different epochs in history.
•Intrusive rocks Granite	•Intrusive rocks: When magma seeps into the fissures and cavities of the lithosphere, it solidifies as it cools without reaching the surface. The cooling and crystallization process being slow under these conditions, the rocks that are formed have a coarse grained texture. Granite is a type of intrusive rock.	2.4 Given a granite rock sample, describe the texture and color of the crystal grains that make up this particular rock. • 2.5 Compare basalt and lava with granite, given a sample of each type of rock. Construct a comparative table which includes the color, texture, and shape of each type of rock. • 2.6 Associate samples of intrusive and extrusive igneous rocks with sketches of the structure of a volcano.

• Enrichment activity

Content	Details on the Content	Suggested Teaching/Learning Activities
Sedimentary rocks Decomposition of rocks	Most of the rocks on the Earth's surface are sedimentary rocks. These are made up of the debris of preexisting rocks and of the remains of plants and marine organisms. Sedimentary rocks are formed generally when sediments are slowly deposited at the bottom of a body of water. At this stage it is advisable to limit instruction to the observation of a few examples of rock decomposition without entering into detailed explanations of erosion. The phenomenon of erosion is the subject of Unit 4.2.	3. Describe how sedimentary rocks are formed. 3.1 Make the pupil aware of the decomposition process in rocks through field observations and by means of photographs illustrating mechanical or chemical weathering. 3.2 Laboratory Activity *Problem:* Prove that sediments come from the decomposition of rocks. *Materials:* a granitic rock, some gravel, and sand of granitic origin. *How to proceed:* – Examine the rock, then give its overall color and the colors of the different grains of which it is made up. – Do the same with the gravel. – Using a magnifying lens, separate the grains of sand into piles of different colors. *Questions:* – Are the fragments of gravel similar to the granite rock? – Are the grains of sand the same color as the gravel and the granite rock? – Do the grains of sand and the gravel come from the rock?
Sediments	Sediments are debris and fragments that come from the destruction of the relief by different agents of erosion. Depending on their origins, sediments are referred to as fluvial, marine, lacustrine, glacial, etc.	3.3 Using a variety of photographs, identify places where sediments can accumulate. Examples: the bed of a river (gravel) a beach (sand) a clay coast

Content	Details on the Content	Suggested Teaching/Learning Activities
Sedimentation Stratification	Sedimentation is the process by which sediments are deposited in water. To enable the pupil to visualize the sedimentation process, the teacher should point out that: – sedimentary particles vary in sizes, – the heaviest sediments sink to the bottom first, – sediments are deposited in layers. Sediments accumulate in successive layers at the bottom of the sea. The pressure on the lower sediments changes them into rock in a process called compaction. Some sediments are bonded together by minerals dissolved in water, calcite, for example, forming rock through a process called cementation. Such sedimentary rocks as shale, sandstone, and pudding stone, are the end products of clay, sand, and gravel sediments that have undergone these two processes.	3.4 Laboratory Activity *Problem:* To identify the *processes of sedimentation and stratification.* *How to proceed:* Make a mixture of fine sand, coarse grained sand, and clay. Pour the mixture into a bottle nearly full of water. Shake the bottle and let it rest for a few minutes. *Observations:* – Describe the sedimentation process. – Draw a sketch of what you see in the bottle and describe the composition of each layer of sediments. 3.5 Identify sedimentary layers in the field or find appropriate pictures. • 3.6 Show a film that illustrates the process of sedimentation and the formation of sedimentary rocks. 3.7 Laboratory Activity *Problem:* To show that the composition and cementation of sediments are necessary processes in the formation of sedimentary rocks. *Materials:* 2 styrofoam cups, coarse sand, a solution composed of two parts of white glue for one part of water. *How to proceed:* – Fill the two cups with coarse sand. – Compact the sand in the two cups. – Pour the glue and water solution in a cup. – Let everything rest for at least 24 hours. – Pour out the content of the cups. *Questions:* Were the sediments sufficiently compacted to solidify and form a rock? What else is needed?

• Enrichment activity

Content	Details on the Content	Suggested Teaching/Learning Activities
	• Flooding rivers carry and deposit some 3 mm of clay per year in ocean basins. If the Rocky Mountains are composed of sedimentary rock layers, it should be obvious that they must have developed over a very long period of time.	• 3.8 Sensitize the pupil to the concept of time in relation to the formation of sedimentary rocks. – Calculate the time it might have taken for a 10 m layer of clay shale to form. – On a photograph of the Rockies (Lake Louise) identify the sedimentary layers that form the mountains.
• Metamorphic rocks	• Metamorphic rocks are igneous or sedimentary rocks that have been changed millions of years ago as the result of tremendous pressures or extremely high temperatures.	• 4. Compare a piece of granite with a piece of gneiss. Do some research to find out where marble and limestone come from and what they are used for.
		5. Crush different types of rocks to study some of their properties: hardness, structure, composition, etc.
Minerals	Igneous rocks and sedimentary rocks are composed of minerals. Example: Granite is made up of three minerals: feldspar (pink or white), quartz (glassy white), and mica (glassy black)	6. Explain and illustrate the fact that rocks are composed of minerals. 6.1 Define and distinguish between a rock and a mineral. 6.2 Using a granite sample, identify the different minerals which make it up. 6.3 Taking a sample of granitic sand, separate the different grains on the basis of their color. 6.4 Identify other minerals, using a variety of samples and photographs. Collect a variety of minerals found in the region and find out what use is made of them. 6.5 Identify rocks used in construction. Describe where they are found and for what purposes they are used. Examples: granite, limestone, sandstone, etc.

• Enrichment activity

Content	Details on the Content	Suggested Teaching/Learning Activities
Soil	Soil is a mixture of weathered rock debris and organic material. Soil is important to humanity, for without it agriculture would not be possible. A vertical cross-section of the soil shows different layers called horizons.	7. Study some characteristics of the soil. 7.1 Given a profile or cross-section of the soil, identify its different horizons and then describe the characteristics of each. 7.2 Field work – Dig a hole in the ground to a depth of 50 cm. – Make a scale drawing of the horizons, starting with the surface layer. Indicate their thickness, color, and other characteristics. – Take a sample of each horizon and place each in a separate small plastic bag. – Put each sample in a bottle, add water, shake, and then let the bottles rest for a few minutes. 7.3 Define soil and humus. 7.4 Take samples of the soil in your area, using a borer, an iron pipe, or a shovel. Refer to the table on the following page to identify the characteristics of each sample. 7.5 Make the pupil aware of the fertility of soils. Using appropriate photographs, identify a particular crop cultivated on different soils. Compare the yield from a fertile soil to that from a poor soil. 7.6 Collect a variety of pictures or give a number of examples in your area which illustrate the fertility of the soil or show how fertile soils are used.
Horizons	The upper layer, or A Horizon, is the layer in which primary soil materials are deposited and leaching occurs. It is in this layer that humus is formed as the result of the decaying of dead plants and animals. The middle layer, or B Horizon, is the layer in which the accumulation of material from the A Horizon takes place. The minerals and other soil particles resulting from the leaching that occurs in the upper layer collect at this level. The lowest layer, or C Horizon, is the relatively unaltered parent material of the soil, the mass of weathered rock.	
Fertility	While it is important to make the pupil aware of the fertility of soils, it is not necessary to dwell on the different factors involved.	

Table for Soil Analysis[1]

	Light Compost	Heavy Compost	Fine Sand	Coarse Sand	Silt	Clay
1. Is it sandy?						
2. Can it be rolled into balls?						
3. Does it spot your fingers?						
4. Is it smooth?						
5. It is sticky?						
6. Can it be broken in pieces or reduced to powder?						

1 These characteristics of a soil can be determined by rubbing a sample between two fingers.

UNIT 4.1	**Terminal Objective: 4.1 To describe the processes by which relief is formed.**	
	Intermediate Objectives: 4.1.4 To distinguish among the main structural units.	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
Types of relief	The principal types of relief (mountains, plateaus, plains) correspond generally to the major structural units of the planet shields, sedimentary lowlands, fault-block mountains, fold mountains, volcanic mountains).	1. Review Objective 2.2.1, concerning the location of the major physiographic units of the planet (mountains, plateaus, plains). 2. Review Objective 3.3.4 concerning landforms (plains, plateaus, mountains, hills, valleys).
Structural units	The major land forms that exist today developed from these structural units as the result both of the action of the earth's internal constructive forces and the natural evolution of the relief through the millenia.	3. Make the connection between the structural units and the major relief forms (physiographic units) of the planet. 3.1 Place a physiographic map (relief map) of the world over a map of the structural units.
Shields	Shields are the rigid blocks of ancient rock that form the core of the continents.	3.2 Locate these shields on a map of the structural units: Canadian Shield, • Brazilian Shield, • Baltic Shield, • Siberian Shield, • African Shield, • Australian Shield.
	The teacher might want to connect all this with the materials of the earth's crust studied in Objective 4.1.3.	3.3 Define a shield. • 3.4 Describe the type of rock in a shield.

• Enrichment activity

Content	Details on the Content	Suggested Teaching/Learning Activities
Sedimentary lowlands	Sedimentary lowlands are the result of the erosion of the shields and subsequent sedimentation of their debris at the bottom of oceans.	3.5 Locate these sedimentary lowlands on a map of the structural units: – Interior Plains of North America – Amazon Lowlands – Siberian Lowlands – European Plain – African Lowlands – Plain of China – Australian Plains • 3.6 Define a sedimentary lowland. • 3.7 Describe the arrangement and nature of the rock mass in sedimentary lowlands.
Mountain ranges	Isolated mountains and mountain ranges are the result of the action of the earth's internal constructive forces. They are formed through folding, faulting, and volcanism.	3.8 Locate these fold mountains and fault-block mountains on a map of the structural units: – Western Cordillera – Andes – Alps – Himalayas Locate the volcano and earthquake zones: – The Ring of Fire of the Pacific – The Mid-Atlantic Ridge – The Mediterranean Coast • – The African Faults 3. Define mountains and mountain ranges.

• Enrichment activity

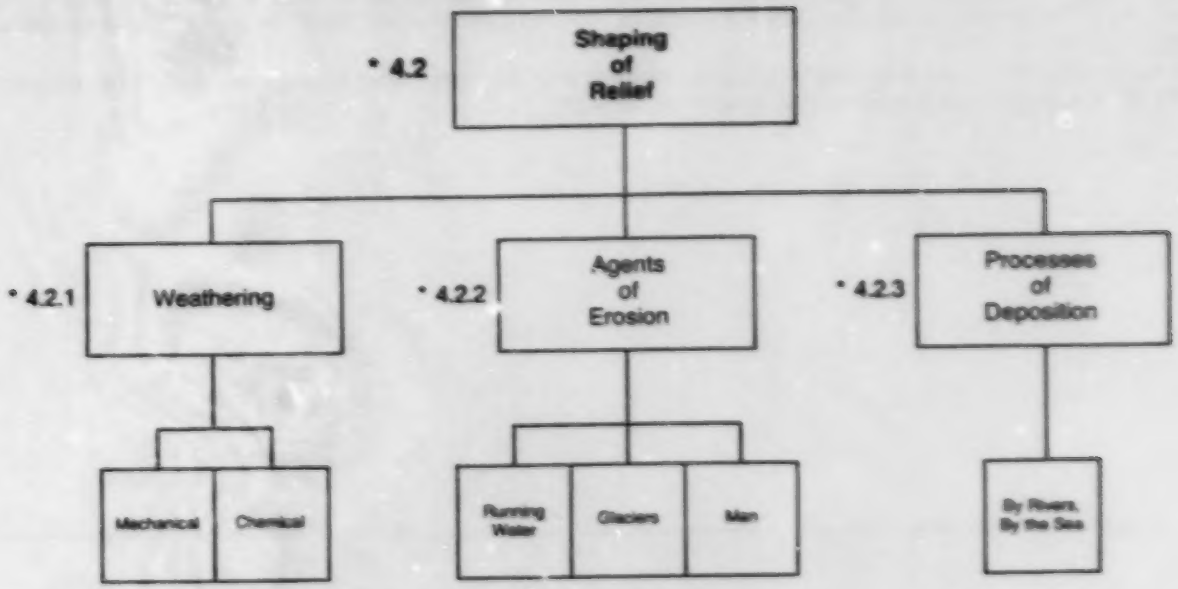
Unit 4.2

Terminal Objective * **4.2 To describe the processes which change relief.**

Intermediate Objectives:

* 4.2.1 To identify the two main types of weathering.
* 4.2.2 To describe the action of different agents of erosion.
* 4.2.3 To identify some processes of deposition.

ORGANIZATION OF THE CONTENT



* Objectives marked with an asterisk are optional.

HOW TO TEACH UNIT 4.2*

Whereas the focus of the preceding unit was the formation of relief, the concern of this optional unit is the evolution of landforms through time. While internal constructive forces shape the earth's crust and create the major landforms, other antagonistic forces work constantly at destroying them. These destructive processes, namely, weathering and erosion, gradually transform the surface of the earth. The first objective focuses on the process that precedes erosion, that is, on mechanical and chemical weathering. Rocks, which are fragmented or decomposed as the result of weathering, are more easily acted upon by the agents of erosion. The agents of erosion are studied in connection with the second objective. While these agents are many and varied, only three have been selected for study in this unit: water, glaciers, and human activity. It is important to stress that water in its various forms is the most important agent of erosion. Runoff, streams, and rivers, carry away particles of rock and soil and deposit them as sediments on the land, or in a lake or in the sea. Glaciers erode their bed, dragging and depositing materials in the areas they occupy. Man, also, contributes to the process of erosion through his activities. Several examples or case studies concerning man as an agent of erosion are suggested in the Guide. These cases can easily be observed by the pupil.

If he assimilates these first two objectives well, the pupil should understand that the material eroded from one spot reappears elsewhere, accumulating in certain areas where the sedimentation or deposition process will continue. The sedimentation process has been studied in the preceding unit (See Sedimentary Rocks, Activity 3, p. 114). However, at this stage it might be worthwhile discussing such examples as deltas and flood plains to illustrate the process. The pupil will have a better understanding of the overall process of evolution of landforms if he can make the connection between erosion and sedimentation or deposition.

This unit being optional, it is not advisable to spend too much time on the many activities suggested in the following pages. There are still the compulsory objectives that need to be covered.

* This unit is optional.

UNIT * 4.2	**Terminal Objective: * 4.2 To describe the processes by which relief is formed.**	
	Intermediate Objectives: * 4.2.1 To identify the two main types of weathering.	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
Weathering Disintegration Decompo-sition	Weathering breaks down solid rock into smaller fragments. The process involves the disintegration and decomposition of rocks by atmospheric agents (temperature and humidity), biological agents (plants and animals), and gravity. There are two types of weathering: mechanical weathering and chemical weathering.	1. Make the pupil aware of the weathering process. 1.1 Using photographs or examples in the field, show the effects of decomposition in rocks. (Activities 3.1 and 3.2, p. 114). 1.2 Using the sand table, show that running water moves rock fragments more easily than a solid rock mass. Observe the process on a photograph of a scree. By means of appropriate questions, help the pupil understand that the process will gradually wear away the mound and that the rock fragments will be carried elsewhere.
Mechanical weathering	Mechanical weathering breaks down rocks into smaller fragments without altering their chemical makeup. Frost action and root growth are the causes of mechanical weathering. The effects of root growth are clearly visible on the wall of a cliff, for instance.	2. Explain and illustrate mechanical weathering. 2.1 Explain and illustrate by means of readily observable examples, that water expands in freezing and destabilizes the materials which it has infiltrated. For example, a bottle full of water breaks when the water freezes. Roads, sidewalks, cliffs disintegrate in the spring. 2.2 Using sketches or photographs, show the effects of root growth.

Content	Details on the Content	Suggested Teaching/Learning Activities
Chemical weathering	Chemical weathering decomposes rock masses, that is, changes their chemical makeup. This chemical process is due primarily to the action of water, and to a lesser degree to the action of atmospheric and organic acids. This activity (3.4) is intended to help the pupil understand that the effects of weathering vary according to the age and nature of the stone. The age of the stone can be determined by checking the date indicated in the epitaph. Air pollution in cities speeds up the weathering process that affects stone buildings. Due to the salty air and sea winds, weathering is widespread in coastal areas.	3. Explain and illustrate chemical weathering. 3.1 Experiment Put a small fragment of limestone in diluted hydrochloric acid. The solution will boil and the limestone will disappear in a short time. When the acid solution evaporates, a white powder is left in the bottle. This powder is a substance that is completely different from the original rock. The rock, therefore, has undergone a chemical change. 3.2 Using photographs, identify examples of chemical weathering in limestone (grottoes, caves, etc.). 3.3 List a number of examples of chemical and mechanical weathering in your area. Examples: rust on metal objects, verdigris on copper objects, etc. • 3.4 On a field trip to the local cemetery: - Compare the effects of weathering on old and recent tombstones; - Compare the effects of weathering on granite and limestone tombstones. • 3.5 On a field trip through the city streets, compare the condition of the buildings or monuments, taking into account the materials used and the period of construction. • 3.6 Discuss the reasons why the effects of weathering are generally more obvious in the city than in the country. - Discuss the reasons why weathering occurs at a greater rate on the coast than inland.

• Enrichment activity

UNIT * 4.2	**Terminal Objective: * 4.2 To describe the processes by which relief is formed.**	
	Intermediate Objectives: * 4.2.2 To describe the action of different agents of erosion.	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
Erosion Agents of erosion	Erosion is the process that moves rocks and soil particles on the earth's surface from one place to another. The elements that are responsible for this process are known as agents of erosion. Three agents of erosion are highlighted in the course: running water, glaciers, and human activity. Water in its different forms is the most effective agent. While the quantity of water available on earth remains basically constant, its location and state vary. In Activity 2.1 the teacher should explain the water cycle and emphasize the fact that runoff depends on the amount of precipitation.	1. Define erosion. 1.1 Using photographs, identify examples of erosion due to the actions of running water, glaciers, and man. 1.2 Make the distinction between erosion and weathering. - Review the preceding objective. - Emphasize that erosion *moves* the products of weathering and carries them to other places. 2. Describe the erosion process caused by running water. 2.1 Using an appropriate sketch, explain the water cycle and define the following terms: evaporation, condensation, precipitation, runoff. 2.2 Using a sand table, carry out the following activities: - Observe how the speed of a stream varies with the volume of water. - Repeat the preceding activity with the sand table set at a steeper slope. Describe what happens. - Construct a model of a river on the sand table. Turn on the water faucet slowly and add coloring. Observe in which part of the river the water reaches its highest speed. - Shape a meander. Observe in which part of the curve (inside or outside) the speed of the stream is higher.
Erosion by running water Water speed Water volume	Erosion by running water is influenced by the speed and volume of the water, and the slope and nature of the terrain where the water flows. The speed of running water is directly related to the volume of the water and the slope of the terrain.	

Content	Details on the Content	Suggested Teaching/Learning Activities
	The speed of a river is highest at the center of the stream. The speed is reduced toward the sides and at the bottom due to the friction of the water against the ground. The stream flows the fastest outside the curve and the slowest inside the curve because of centrifugal force.	2.3 Using a sketch of the cross-profile (bottom) and longitudinal profile (sides) of a river, indicate the places where the speed of the flow is highest. 2.4 Using a variety of film loops, repeat the exercises carried out in Activity 2.2 in order to describe the process of erosion by running water.
Ground slope	Erosion by running water occurs particularly at the points of greatest friction (bottom and shores of the stream or river).	2.5 Based on the experiments carried out in Activity 2.2, give a description of the process of erosion in a river when the speed and volume of the water vary. 2.6 On the sketch used in Activity 2.3 indicate the spots where erosion is most effective.
Alluvium (Alluvial deposits)	The sediments carried and deposited by a stream or river, and composed of mud, sand, and gravel, are refered to as alluvium or alluvial deposits. Since the rate of erosion is highest on the sides of the river, the alluvium is more abundant there.	3. Field trip: Study of a local river. 3.1 Take water samples at the edges and at the center of the river. Fill a number of bottles and let them rest a few minutes. Compare the quality of sediment in each sample. 3.2 Measure the speed of a river, using some floats and a stop-watch. Repeat the same activity at different spots to find out where the current is swiftest. 3.3 Plumb the bed of a river in different places, using a rope and a weight. Draw a profile of the river bed based on the results and indicate where the rate of erosion is highest. 3.4 Observe a flooding river. Indicate where the rate of erosion is highest. Describe the action of stones and pebbles in the bed of the river. NOTE: If it is not possible to organize a field trip, these activities can be simulated with the help of photographs and transparencies.

Content	Details on the Content	Suggested Teaching/Learning Activities
Formation of river valleys Vertical erosion Lateral erosion Alluvial plains	Phase 1: The river carves out the bottom of the valley in a narrow V shape (vertical erosion). The bed of the river occupies the whole valley. It is irregular, interrupted by falls and rapids, and is pebbly. The current is swift because of the steep slope. Phase 2: The river widens the bottom of the valley in a broad V shape (lateral erosion). The bed of the river occupies only a section of the bottom of the valley and it tends to settle and become more regular. The volume of the water increases and the river is less pebbly. Phase 3: The valley has been replaced by an alluvial plain. The river meanders through the landscape, increasing in volume and speed as more tributaries connect with it and flooding occurs. The bottom of the river at this stage is sandy or clayey.	4. Explain and illustrate how rivers shape landforms by eroding the land. 4.1 Using a model or a photograph of a narrow V-shaped valley (a gorge or a canyon), study the nature of the erosion process. Draw a sketch of the valley and indicate the areas where erosion occurs. Describe the valley and the bed of the river. 4.2 Using a model or a photograph of a broad V-shaped valley, repeat the preceding exercise. 4.3 Using a model or photograph of an alluvial plain, repeat the preceding exercise.

Content	Details on the Content	Suggested Teaching/Learning Activities
Glacial Regions Alpine glaciers Continental glaciers Formation of glaciers	There are two types of glaciers: alpine glaciers, found in high altitude regions, and continental glaciers or icecaps, found in the polar regions. In temperate regions, glaciers are formed at altitudes above 2 500 or 3 000 m. In tropical regions, glaciers are found at altitudes above 5 000 m. In cold regions, the snow melts only partially and accumulates annually. The snow compacts under its own weight and gradually turns into a mass of ice that can move down a slope. The ice slides faster on top and at the center of the mass than at the bc" and edges.	5. Locate the different glacial regions. 5.1 Using photographs and transparencies, distinguish between an alpine glacier and a continental glacier. 5.2 Using a map of the world in which the different glacial regions are indicated, answer the following questions: – Which are the regions covered by continental glaciers? – Name the mountainous regions where alpine glaciers are found. – Why are glaciers found in such tropical regions as Africa? 6. Describe how glaciers are formed. 6.1 Using the photograph of an alpine glacier, identify the zone of accumulation, the front, and the glacial tongue. 6.2 Using a sketch of an alpine glacier, find how the movement and speed of the glacier can be measured. 6.3 On the same sketch, identify with arrows the parts of the glacier that flows the fastest and those that flow the slowest. Explain the difference in speed between these different parts. (Review Activity 2 which is concerned with erosion by running water, pp. 125 and 126).

Content	Details on the Content	Suggested Teaching/Learning Activities
Glacial erosion	As a glacier moves, rocks and debris are carried along, pushed in front of it, and deposited elsewhere. The glacier functions like a giant plane as it erodes its bed and loosens everything that is not solidly fixed. The soil under the glacier is the first to go, and the underlying rock becomes streaked or smooth. The glacier carries the materials it digs up as well as those that fall from the walls of the valley. The ice mass moves big rock blocks and debris of all sizes, which are spread about (erratic blocks), or accumulate (moraine) at the bottom of the valley.	7. Describe the process of erosion caused by a glacier. 7.1 Using a photograph of the surface of an alpine glacier, identify the materials picked up and carried away by the glacier. 7.2 Using photographs, identify the erratic blocks, the streaked rock mass, the glacial streaks, and the smooth rock mass. Draw a sketch to illustrate the process of erosion caused by the glacier. 7.3 Using a sketch of the cross-section of a glacier, identify the lateral, medial, and terminal moraines. Define "moraine".
Glacial valleys	Glacial erosion shapes valleys. A glacial valley presents an irregular longitudinal profile (glacial threshold and navel-shaped depressions) and a trough-shaped cross-profile (vertical walls and rounded bottom).	8. Describe the outcome of glacial erosion, that is, the landscape shaped by a glacier. 8.1 Using a sketch of a glacial landform, identify the glacier, the moraines, and the accumulation zone. Compare this sketch to the sketch of a mountain relief after deglaciation. Identify the peak, the cirque, the trough-shaped valley, the cirque lake, and the hanging valley. 8.2 Using sketches of different forms of alpine glaciation (glacial tongues, crevasses, etc.), identify these forms on a photograph of an alpine glacier. 8.3 Using the same sketches as above, identify different forms of alpine glaciation on appropriate stereoscopic photographs. 8.4 Using the N.F.B. film *Glaciation*, identify glacial erosion in alpine landforms.

Content	Details on the Content	Suggested Teaching/Learning Activities
Icecap	During the ice age North America and Eurasia were covered by an icecap. The erosion process was the same as in the alpine regions but on a larger scale. The effects of erosion caused by the icecap are particularly visible on the Canadian Shield. The pupil should consider: 1. the direction of the drainage system, i.e. the flow of the lakes and rivers (same direction as the flow of glaciers); 2. the presence of plains shaped by the eroding action of glaciers and characterized by a rocky surface and glacial deposits.	9. Define icecap. 9.1 Using a map of the world which gives the location of the different glacial regions, compare the surface area of the Canadian icecap with that of the Scandinavian icecap. 9.2 Using a sketch illustrating the formation of an icecap, explain briefly how the ice sheet develops and grows. 9.3 On a photograph or block-diagram of a region of the Canadian Shield, draw an arrow to indicate the direction of the glacier's movement. Locate that particular region on a map of Canada. 9.4 Using an aerial photograph, identify the direction of glacial erosion.
Erosion caused by human activity	Man contributes to the erosion of the earth's surface through his ignorance of the fragility of existing ecosystems and his abusive exploitation of natural resources. The content of this section of the course should, therefore, help the pupil develop his critical thinking and a sense of values. Here, he is given the opportunity to learn to examine a problem, to evaluate damage, and to look for solutions. To illustrate how man interacts with his environment, the teacher might want to select a variety of current cases relevant to the local region.	10. Show that man can be responsible for the erosion of the soil. Case studies: 10.1 Soil erosion and agriculture Using photographs and pertinent documents, identify a number of agricultural practices which can be responsible for the erosion of the soil. 10.2 Soil erosion and forests Using photographs and pertinent documents, discuss the role of forests in the environment. Discuss the dangers of forest fires, deforestation, acid rain, etc.

UNIT * 4.2	Terminal Objective: * 4.2 To describe the processes by which relief is formed.	
	Intermediate Objectives: * 4.2.3 To identify some processes of deposition.	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
Deposits by running water Transportation	Alluvial sediments transported by running water are deposited when the current becomes too weak and too slow to move them. These sediments are deposited in successive layers, the bigger or heavier ones forming the bottom layers, and the smaller or lighter ones forming the top layers. The pupil should understand that the amount of time it takes for sediments to be deposited depends on their size and weight. The heavier sediments will be deposited faster than the lighter ones.	1. Explain and illustrate the process of sedimentation or deposition. 1.1 Review the deposition stage in the erosion process (Objective 4.2.2) 1.2 Laboratory activity – Fill a container with sand. – Sift the sand, using a graduated sieve. – Pour a sample of coarse sand in a water-filled glass tube or bottle. – Using a stop-watch, note the amount of time it takes for the sand to be deposited at the bottom. – Repeat the same procedure with the fine sand and the medium-grained sand sample. Note how fast the sand is deposited at the bottom in each case. – Repeat the same activity with a sample of unsifted sand and note the order in which the grains of sand drop to the bottom. – Identify the sand sample that took the least amount of time to be deposited and the sample that took the greatest amount of time.
Deposition	The bigger and heavier sediments will be deposited very close to the mouth of the river, whereas the lighter ones will fall to the bottom farther downstream. The pupil should realize that a new landform, a delta, is created by this process.	2. Explain and illustrate how a delta is formed. 2.1 Using the sand table, construct a model of a river and carry out the following activities: – Let the water flow slowly and note the position of the sediments at the mouth of the river. – Increase the water's speed and note the position and surface area covered by the sediments at the mouth of the river. 2.2 Identify the position of different types of sediments on a sketch of a plan or profile of a delta. 2.3 Identify a delta on an aerial photograph or a ground-level photograph.

Content	Details on the Content	Suggested Teaching/Learning Activities
Deltas	It should be pointed out that a delta is an extension of the continental mass.	2.4 Locate the following deltas on a map of the world: the Mississippi, the Rhine, the Nile, the Niger, the Yang-Tze-Kiang, and the Mackenzie. 2.5 If there are any deltas in your region, take a field trip and identify the distribution of sediments at the mouth of the river. • 2.6 Using a block-diagram of a delta, answer the following questions: – What uses can be made of the land in the delta region? – What kind of danger does the flat area of the region represent? – What type of rocks might be found in the region? Igneous, metamorphic, or sedimentary rocks?
Deposition by rivers Flood plains	Deposition by rivers creates a variety of landforms, among which *flood plains* are the best known. Flood plains and delta regions are very fertile, due primarily to the flooding and sedimentation which constantly renew the soils used for agricultural purposes. Flood plains and delta plains are subject to periodic floods which sometimes cause damage to settled areas.	3. Carry on with the laboratory activity 2.1. 3.1 Simulate a flood plain including a number of meanders and levees. – As the water flows slowly, note the erosion and deposition process at work in the curves of the meanders. Note in which part of the curves erosion and sedimentation occur. – Increase the speed and volume of the water. Note how the level of the water rises and how the plain is flooded. – Reduce the speed and volume of the water. Note how sediments are deposited in the flooded plain. 3.2 Using photographs of flood plains, describe the general aspect of these landforms. Point out a few examples of how the land is used. 3.3 Locate flood plains on a map of the world. Examples: the plains of the Po, the Ganges, the Mississippi, the Yang-Tze-Kiang, the Red River, the Nile. 3.4 Discuss the following questions: – If you're building a house next to a river, should you build it inside or outside the curve of a meander? – Should you build a house in a flood plain? If you do, what kinds of problems are you likely to encounter?

• Enrichment activity

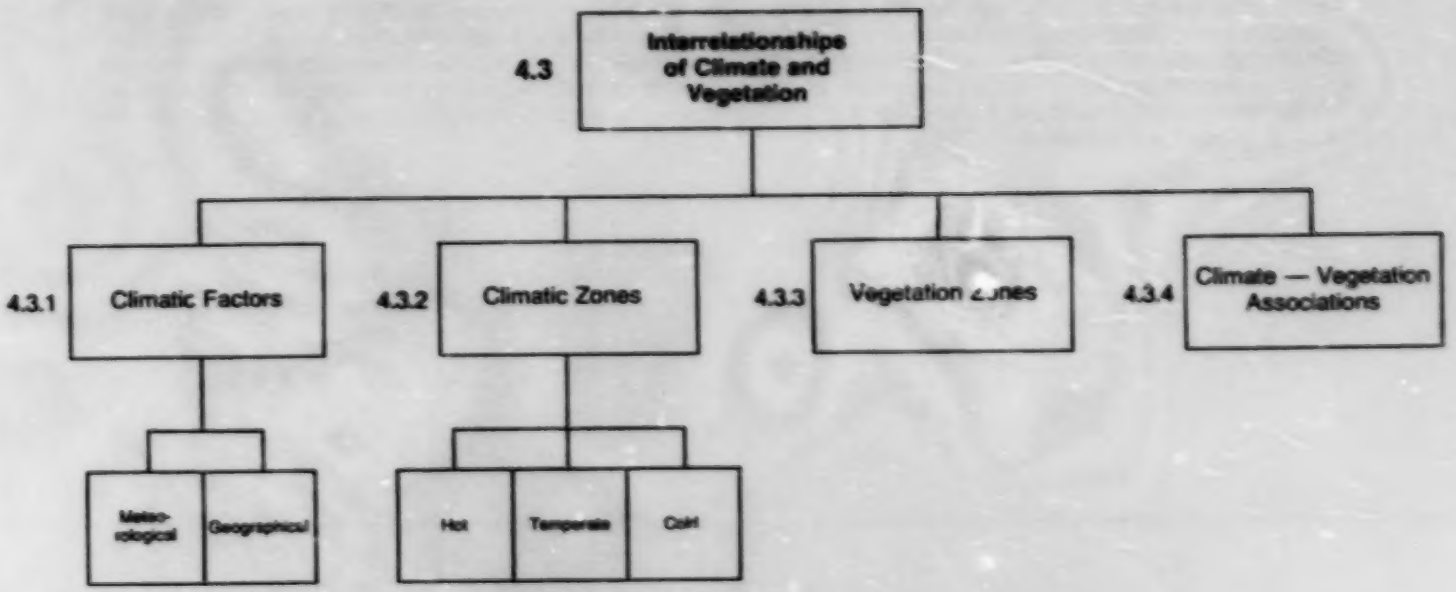
Unit 4.3

Terminal Objective **4.3 To establish the relationships between climate and vegetation.**

Intermediate Objectives:

4.3.1 To identify the factors which affect climate.
4.3.2 To locate the main climatic zones and to identify their characteristics.
4.3.3 To locate the main vegetation zones and to identify their characteristics.
4.3.4 To note the relationships between vegetation and climatic zones.

ORGANIZATION OF THE CONTENT



HOW TO TEACH UNIT 4.3

This part of the program, which follows the unit on landforms, is also concerned with the study of the Earth's surface. The present unit focuses on climate and vegetation, with special emphasis on the relationship between the two.

As regards instructional methods, the Guide encourages direct observation and measurement of the principal features of the weather at a specific time and place. These features or meteorological factors are the following: temperature, humidity, atmospheric pressure, and winds. These rudiments of meteorology should enable the pupil to understand and use the weather reports given on television, on the radio, and in newspapers.

Whereas the weather is the condition of the atmosphere at a particular time and place, climate refers to the long-term interaction between meteorological and geographical factors. These geographical factors are the following: altitude, latitude, and distance from the ocean. The pupil is expected to discover why these geographical factors have a continuous influence on the meteorological factors. He is expected to understand that the long-term combination of all these factors is responsible for the varying distribution of temperature and humidity in different areas of the world, thus determining the different climates. To help the pupil understand this phenomenon, it is recommended that the characteristic climatographs of the different climatic regions be used.

The second objective is concerned with the different forms of vegetation found in each of the climatic regions and with the relationship between climatic conditions and vegetation. The vegetation of the world can be divided into zones similar to the classification of climate into tropical, mid-latitude, and polar zones. However this artificial classification is less important than the necessity of determining the link between each climate and the specific vegetation associated with it. That is why the Guide recommends grouping the Objectives 4.3.2, 4.3.3, and 4.3.4, which should enable the pupil to associate the concepts of climate and vegetation.

UNIT 4.3	**Terminal Objective: 4.3 To establish the relationship between climate and vegetation.**	
	Intermediate Objectives: 4.3.1 To identify the factors which affect climate.	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
Atmosphere Climate Weather	To distinguish the concept of weather from the concept of climate the idea of permanence underlying the concept of climate should be emphasized. The weather is the temporary state of the atmosphere around a certain place at a given time. The climate is a description of the average weather conditions to be expected in a place over the course of the year. Climate, then, is determined by the long-term interaction between meteorological and geographical factors.	1. Explain and illustrate the concept of climate. 1.1 Using a number of photographs depicting a variety of human activities, point out certain features which indicate in which type of climate these activities take place. 1.2 Identify certain characteristics of the weather, using a variety of photographs and pertinent data. Highlight different ways in which the weather affects human activity. Examples: Indicate the consequence of successive rainfalls for the fruit harvest or the consequences of a drought for the wheat crop in the West. Discuss what might happen to wheat growing in the area if the drought lasted a number of years.
Weather conditions	The climate affects the nature of erosion, the types of vegetation, agriculture, the way of life of people in a particular region. It might be pointed out that modern man has the means of bettering his living conditions under different climates, whereas early man had simply to live with them.	1.3 Using appropriate examples, show how man has adapted to weather conditions in different climates. Examples: • How people in the Arctic have adapted to the cold; • How desert people have adapted to hot and dry conditions; • How crops have adapted to different climates; • How human activities are organized in terms of the climate.

Content	Details on the Content	Suggested Teaching/Learning Activities
Meteorological factors Air temperature • Atmospheric pressure Precipitation Wind speed and direction Meteorologist	The climate is determined by meteorological factors. The principal factors which determine the weather or the properties of the atmosphere near the earth's surface are the following: – air temperature, – atmospheric pressure, – precipitation, – wind speed and direction.	2. Explain and illustrate the idea of "weather". 2.1 Observe the sky and describe the weather based on a number of salient features. Discuss the accuracy of the observations made. Compare these observations with the weather forecasts for the day, and verify them with the aid of appropriate meteorological instruments. 2.2 Learn to use meteorological instruments and to measure atmospheric properties while making formal observations of existing atmospheric conditions.
Meteorological instruments	Meteorologists measure these factors by means of appropriate instruments such as: – the thermometer, – the barometer, – the rain gauge, – the anemometer, – the wind vane, – the hygrometer.	• 2.3 Build a number of meteorological instruments with the aid of the document entitled *Basic Weather Facts* published by Environment Canada. 2.4 With the aid of appropriate meteorological instruments, record daily atmospheric conditions, using a table for that purpose.
Meteorological data	In order to enable the pupil to grasp the concept of time, it is advisable to have him collect atmospheric data for at least a week, and even for a month if possible.	2.5 Compare these data with those of the local weather station. 2.6 Based on the daily meteorological data, find the average temperature and atmospheric pressure, the total precipitation, and the average direction of the wind in the area. Give a brief description of the week's weather. Note the connection between changes in atmospheric pressure and the wind. Also note the connection between atmospheric pressure and the weather.

• Enrichment activity

Content	Details on the Content	Suggested Teaching/Learning Activities
	Collecting atmospheric data not only makes it possible to verify personal observations but also shows that atmospheric conditions vary from one area to the next and that it is necessary to generalize these data for regional meteorological forecasts. Wind force is determined by means of the Beaufort scale. Similarly, cloud types can be identified by means of the cloud atlas. (Environment Canada) Regional meteorological data can be obtained from: Environment Canada Atmospheric Environment Service *Annual Meteorological Summary*	
Climatograph Annual and monthly averages	A climatograph is a graphic representation of the monthly temperature and precipitation averages in a region. The climatograph represents the climate of the region when it is based on average temperatures and precipitation for several years. It should be pointed out that in our latitudes the westerlies are the dominant winds.	2.7 Using the monthly averages provided by the local weather station, draw the temperature and precipitation graphs for your town. Questions: – What is the average temperature for the warmest month? What is the average temperature for the coldest month? – What is the temperature range for the year? – What is the average temperature for the year? – How many months does the summer last? How about the winter? – What is the total precipitation? Which is the wettest month? – What is the predominant direction of the winds? – Describe the climate of your town. 2.8 Describe the weather for the past year based on the climatograph of a region.

Content	Details on the Content	Suggested Teaching/Learning Activities
Geographical factors Latitude	The climate is also determined by such geographical factors as: – latitude, – altitude, – distribution of land and sea, – distance from the sea. *Latitude and climate:* Latitude and temperature Annual temperatures vary according to the latitude, that is, they decrease from the Equator to the Poles due to the uneven distribution of solar heat over the earth's surface. The Sun's rays are vertical at the tropics and increasingly slanted toward the Poles.	3. Show how latitude affects the distribution of temperatures. 3.1 Explain the fact that the planet is unevenly heated. Refer to the earth's tilt and revolution. 3.2 Illustrate or describe the direction of the Sun's rays at the Equator, in the Tropics, at the Polar Circles, and at the Poles. 3.3 Using as reference a map of the world on which average yearly temperatures are indicated, on an outline map: – Color in red the zones with temperatures over 20°C; – Color in yellow the zones with a temperature range from 0°C to 20°C; – Color in blue the zones with temperatures below 0°C; – Identify the latitudes corresponding to the three zones defined above; – Locate the Equator, the Tropics, the Polar Circles. 3.4 Follow the meridian corresponding to longitude 80°W and give the yearly temperatures at the following places: Ellesmere, James Bay, Ottawa, Washington, Miami, Cuba, Panama, Quito, Santiago, Tierra del Fuego.

Content	Details on the Content	Suggested Teaching/Learning Activities
	Latitude and precipitation The connection between latitude and precipitation is not as close as that between latitude and temperature. Generally, however, the wettest zones are found at the Equator and on the west side of the continents, whereas the dry zones are located in the Tropics, the Polar regions, and on the east coast of the continents.	4. Show how latitude affects precipitation distribution. 4.1 Using as reference a map of the world on which average yearly temperatures are indicated, on an outline map: – Color in mauve the regions with an annual precipitation average of more than 2000 mm; – Color in blue the regions with an annual precipitation average between 500 and 2000 mm; – Color in light blue the regions which average between 200 and 500 mm a year; – Color in yellow the regions which average less than 200 mm a year; – Locate the Equator, the Tropics, the Polar Circles; – Identify the wettest and the driest regions in the world, in Canada, and in Québec. 4.2 Follow the parallels corresponding to the Tropics and identify the deserts. 4.3 Compare the annual precipitation map and the annual temperature map. *Questions:* – Are the warmest regions also the driest? – Are the polar regions also the wettest?
Altitude	*Altitude and climate* Altitude and temperature: Increased altitude means lower temperatures. The reason is that, due to the decreasing density of the air at higher altitudes, less solar heat is absorbed by the atmosphere. The temperature decreases at an average rate of 1°C per 160 metres.	5. Show how altitude affects temperature distribution. 5.1 *Questions:* – In our climate, during the month of July, is it cooler in the mountains than in the plains and valleys? – Why is there snow on very high mountain tops in summer? 5.2 Using a photograph or a sketch of a mountainous region, observe and explain the changes in vegetation and land use from the base to the top. 5.3 During a field trip to the mountain, calculate the difference between the temperatures at the base and the top of the mountain. 5.4 If the temperature at the base of the mountains is 20°C, what will be the temperature at an altitude of 3 000 metres?

Content	Details on the Content	Suggested Teaching/Learning Activities
Relief rainfall	Altitude (relief) and precipitation: Precipitation is more abundant on the windward sides of high mountains. As the air rises along the side of the mountain, the moisture it carries cools down and condenses.	6. Show how altitude affects precipitation. 6.1 *Questions:* – Explain why there are clouds over the ocean? – In what directions do these clouds move in our latitudes? – What happens to them when they reach a landform? – Why does it rain when the clouds rise over the side of a mountain? – At what altitude does snow replace rain? – What happens on the other side of the mountain? 6.2 Draw a sketch to illustrate *relief rainfall*. Identify the wet side and dry side of the mountain. 6.3 Using a relief map and an annual precipitation map, identify the wet and dry mountainous regions. Identify the direction of the winds.
Trade winds	At the Equator heated air rises constantly without any other major movement. This region is known as the doldrums belt. Air moves constantly from the high-pressure tropical zones to the equatorial low-pressure belt. As a result, winds blow constantly toward and away from the Equator. The winds blowing toward the Equator are known as trade winds. In the Northern Hemisphere they are deflected from the northeast to the southwest by the earth's rotation. In the Southern Hemisphere they are deflected from the southeast to the northwest.	6.4 Using stories of the great explorations as a backdrop, compare the general direction of these explorations and the direction of the winds in the Western Hemisphere. 6.5 Draw a sketch of the globe, showing the Equator, the Tropics, the Polar Circles, and prevailing wind directions.

Content	Details on the Content	Suggested Teaching/Learning Activities
Distance from the sea	Distance from the sea, temperature, and precipitation: Because the sea cools down and heats up more slowly than the land, it has a moderating influence on the climate of coastal regions. Winters are milder and summers are cooler in these regions. Precipitation is also heavier in these regions, particularly on the west coast of the continents.	7. Show how, in certain regions, distance from the sea, temperature, and precipitation are interrelated. 7.1 Using a map of North America or of Canada, and climate graphs of Vancouver and Winnipeg, carry out the following activities: – Locate these cities; – Calculate the difference in temperature between the warmest and the coldest months; – Calculate the total precipitation in the two cities and identify the wettest season; – Do the same for Seattle and Denver.
Continental climates	Continental interiors, by contrast, are less affected by the moderating influence of the sea on the climate. Consequently, in the interior regions temperature ranges are broader. Winters are longer and more severe, and summers often are short and hot. Also, these regions receive less precipitation.	7.2 Repeat the exercises in Activity 7.1, this time for the cities of Seattle, San Diego, and Sacramento. 7.3 Repeat the exercises in Activity 7.1 for the cities of Dawson and Edmonton. 7.4 Using the daily weather report, keep a record of the temperature and precipitation in the cities of Halifax, Québec, Montreal, Toronto, Winnipeg, Calgary, and Vancouver, during a particular week. – Calculate the average temperature in each city during that week. – Calculate the total precipitation for each city.
Human influence	It is through the phenomenon of urbanization that man affects the climate. Cities produce heat, alter the surface of the ground, and pollute the atmosphere. As a result a micro-climate is created. Fuel combustion and heat loss from buildings increase temperatures in the center of the cities.	8. Show how human activity can affect the climate. 8.1 Experiment – Ask a pupil to record morning and evening temperatures in the suburbs for a week. (Note: The pupil will take those readings himself if he lives outside the city. If not, he might ask a relative or a friend to collect the data for him). – Ask another pupil to record temperatures in the city's downtown district. – Draw a graph based on these data and compare them. – Find out the reasons for the differences that are noticed.

Content	Details on the Content	Suggested Teaching/Learning Activities
	• In a big city like Montreal, ensuring an adequate supply of heating fuel for homes and buildings is an important task. Distributors usually refer to the "day-temperature heating" scale to calculate fuel consumption in advance.	• 8.2 Using Table 28 in the book entitled *La saison du chauffage* (Powe, 1970, p. 41), identify the months and the places with the highest monthly "day-temperature heating" average.
	• The cooling effect of the wind on temperatures (windchill factor) makes itself felt particularly in the suburbs and in certain parts of the city, especially in the sky-scraper canyons, where the height of the buildings affects wind direction and velocity.	• 8.3 Using a thermometer and an anemometer, measure and compare temperatures and wind direction in a spot protected by a building and in an area exposed to the wind.
	• In cold weather the increased use of heating fuel raises the normal level of pollution. This is particularly noticeable on mild windy days or when the temperature drops. Under these conditions the smoke from the chimneys rises to a certain height and then tends to fall back to the ground.	• 8.4 Using seasonal and weekly graphs of the pollution index for Montreal, identify: – the months and days when pollution is highest, and the months and days when pollution is lowest; – the factors responsible for these differences. • 8.5 Using a number of weather reports for your region, plot a graph in which pollution index, temperature, and wind velocity are indicated. Refer to this graph to relate pollution level and temperature, and pollution level and wind velocity.

• Enrichment activity

UNIT 4.3	**Terminal Objective: 4.3 To establish the relationship between climate and vegetation.**	
	Intermediate Objectives: 4.3.2 To locate the main climatic zones and to identify their characteristics. 4.3.3 To locate the main vegetation zones and to identify their characteristics. 4.3.4 To note the relationship between vegetation and climatic zones.	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
Climatic zones	Temperature, precipitation and winds combine in different ways to determine the climate in different regions of the world. The distribution of temperature divides the world into three main climatic zones: hot, temperate, and cold zones.	1. Locate the main climatic zones. 1.1 Using a planisphere or a map of the world locate the hot zone, the two temperate zones, and the two cold zones. 1.2 Locate the principal climates within the major zones identified in Activity 1. 1.3 Compare a map of annual precipitation and temperatures throughout the world with a map of the different climatic zones. *Questions:* – Are the regions in the hot zone similar in terms of precipitation? Identify the humid and the arid regions. To which climatic zone do they correspond? – Answer the same questions with respect to the temperate zones and the cold zones.
Vegetation zones	The uniformity of climatic conditions in each zone results in the development of distinct types of vegetation and affects animal and human life in specific ways. The hot zone comprises three types of climates: – equatorial, – tropical, – desert. The two temperate zones also comprise three types of climate: – Mediterranean, – maritime, – continental. The cold zones comprise two types of climate: – polar, – mountain.	

Content	Details on the Content	Suggested Teaching/Learning Activities
Hot zone Equatorial climates Equatorial vegetation	The hot regions are distributed on either side of the Equator. The equatorial climates are found in the regions on either side of the Equator, between 5° South and 10° North. Temperatures at the Equator are constant, uniformly high around 25°C, and the mean annual range is infinitesimal. Precipitation is abundant (2 to 4 metres), and it rains regularly every day. The heat and humidity of equatorial climates are favourable to plant growth. These are the regions of the rainforest in which giant trees (45m) overshadow shorter trees, which in turn stand over the dense vegetation at ground level. Tree roots are not very deep, although they are extensive. This climate is unhealthy. There are few human settlements in these regions and large animals are rare.	2. Show how the climate and the natural vegetation of the equatorial regions are interrelated. 2.1 Locate the equatorial climatic regions. 2.2 Study one or several climate graphs of equatorial regions: – Calculate the mean summer temperatures. – Calculate the mean winter temperatures. – Calculate the annual temperature range. – Calculate the total rainfall. – Describe the annual distribution of precipitation. – Locate these stations on a map of the climatic regions. 2.3 Based on descriptions or illustrations of the equatorial regions, describe the characteristics of equatorial climates. 2.4 Based on illustrations of the equatorial regions, describe the natural vegetation of these regions. *Question:* – What are the factors that make communication difficult in the rainforest? • 2.5 Investigate and then identify the plants and animals found in the equatorial regions. • 2.6 Investigate and then identify the customs of the people who live in the equatorial regions. Examples: Harvesting of rubber in the Amazon forest, cultivation of cacao or of oil-producing palm in West Africa.

Content	Details on the Content	Suggested Teaching/Learning Activities
Tropical climates	The tropical regions are located between the Tropics on either side of the Equator. It is often hotter in these regions than at the Equator. However, it rains there only during the rainy season. The rainy season gets shorter the closer one gets to the Tropics. There are, then, two types of tropical climates: the tropical rainy climates and the tropical dry climates.	3. Show how the climate and the natural vegetation of tropical regions are interrelated. 3.1 Locate and distinguish between a tropical region with a rainy climate and a tropical region with a dry climate. 3.2 Study one or several climate graphs of a tropical region with a rainy climate and of a tropical region with a dry climate: – Calculate the mean summer and winter temperatures. – Calculate the amount of rainfall received during the summer months and the winter months. Calculate the total rainfall. – Describe the annual rainfall distribution. – Locate these stations on a map showing the climatic regions. 3.3 Based on descriptions or illustrations of tropical regions, describe certain characteristics of the climate. 3.4 Identify and locate a number of tourist places that are renowned for their climate. 3.5 Look in travel brochures to find pictures illustrating some tropical regions, with both dry and rainy climates. 3.6 Based on a variety of pictures and on information gathered through research, describe the natural vegetation of tropical regions.
Tropical vegetation	In the tropical regions, where the dry season is longer, the rain forest disappears to be replaced by the savanna. The vegetation of the savanna is quite dense near the equatorial regions, but it gradually thins out towards the Tropics to become finally the steppe or the bush.	3.7 Identify a number of activities characteristic of tropical regions. 3.8 Look up the definition of the following terms: savanna, steppe, bush. Illustrate these terms. • 3.9 Using a map showing the different natural vegetation zones, observe the sequential arrangement of the vegetation zones. Explain this phenomenon with the aid of a map showing rainfall and temperature averages. • 3.10 Investigate and identify the plants and animals found in a tropical region.

• Enrichment activity

Content	Details on the Content	Suggested Teaching/Learning Activities
Desert climates	Hot deserts are found in regions around the Tropics. They are characterized by: – a dry season that lasts all year; rains are scarce and irregular (less than 100 mm a year). – a broad annual temperature range (in Cairo, for instance: 13°C in January and 28°C in July); – a significant difference between day and night temperatures (in Salah: +53°C and −4°C).	4. Show how the climate and the natural vegetation of desert regions are interrelated. 4.1 Locate a number of regions with a desert climate. 4.2 Analyze one or several climate graphs of a desert region: – Calculate the summer and winter mean temperatures. – Calculate the total rainfall. – Describe the annual rainfall distribution. – Locate these stations on a map showing the climatic regions. 4.3 Explain the difference between day and night temperatures. 4.4 Based on descriptions and illustrations of desert regions, indicate the characteristics of the climate. 4.5 Look up the definition of the terms "oasis," "wadi." 4.6 Based on a variety of illustrations or on information collected through research, describe the vegetation of desert regions. 4.7 Identify a number of activities typical of desert regions. Examples: – date cultivation and trade, – nomadic cattle raising. 4.8 Read descriptions of a variety of desert phenomena: sandstorms, mirages, nomadic life. • 4.9 Identify a few desert plants and animals.
Desert vegetation	The sand, the rocky soil, and the drought that characterize deserts are favorable to the growth of a few xerophyte plants.	

Content	Details on the Content	Suggested Teaching/Learning Activities
Temperate climates	The temperate climates are found between the 30th and 60th parallels. The annual distribution of temperatures in these climates defines the four seasons, and winter and summer are generally contrasted. Precipitation occurs in all seasons, the influencing factor being the changing weather of these latitudes. Based on certain geographical factors (latitude and distance from the sea), the temperate climates are divided into three types: Mediterranean, oceanic or marine, and continental.	5. Show how the climate and the natural vegetation of temperate regions are interrelated. 5.1 Locate the regions with a temperate climate, making the distinction between Mediterranean, oceanic or marine, and continental climates. 5.2 Compare three climate graphs of three different temperate regions (Mediterranean, oceanic, and continental). In each case: – Calculate the summer and winter mean temperatures; – Determine the annual temperature range; – Calculate the amount of precipitation for the winter months and for the summer months; – Describe the annual rainfall distribution; – Locate these stations on a map showing the climatic zones. 5.3 Based on a variety of pictures, describe the natural vegetation of the temperate climates (Mediterranean, oceanic, and continental). 5.4 Identify plants and animals that are likely to be found in each of the three types of temperate climates. 5.5 Identify the climate of your region and describe its main characteristics. 5.6 Identify seasonal agricultural and/or tourist activities in your region. 5.7 Identify plants and animals typical of temperate regions. 5.8 *Questions or investigation topics* – Compare the rural landscapes of Québec, of a Mediterranean country, and of a region with an oceanic climate. – Compare the natural vegetation of continental, oceanic, and Mediterranean climates.
Mediterranean climates	The Mediterranean climate is characterized by its hot and dry summers, and by its mild and wet winters.	
Mediterranean vegetation	These climatic conditions favor the development of the maquis and the garrigue.	
Oceanic climates	Regions with an oceanic climate are under the influence of the sea. In these regions winters are mild and summers are cool. Precipitation is abundant in all seasons.	
Oceanic vegetation	These climatic conditions favor the growth of grasslands and of broad-leaf trees.	

Content	Details on the Content	Suggested Teaching/Learning Activities
Continental climates	Continental climates are characterized by two sharply contrasting seasons: a long, cold winter, and a short, hot, rainy summer.	
Continental vegetation	Climatic conditions in the colder northern regions favor the growth of coniferous forests or taïga, whereas in the climate of the drier regions we find the prairies or grasslands.	
Cold zones	Cold climates are found in polar regions and high altitude areas.	
Polar climates	A constant and pervasive cold characterizes the polar regions. Winter lasts about nine months with temperatures averaging −30°C and reaching minimums of −50°C and less. Because of the limited amount of sunlight received by these regions and the narrow angle at which the sun's rays reach the atmosphere, there is no real summer in these regions. Temperatures rarely go above 0°C.	6. Show how the climate and the natural vegetation of cold regions are interrelated. 6.1 Locate the regions of polar climate and the regions of mountain climate: – Calculate summer and winter mean temperatures. – Determine the annual temperature range. – Calculate the total precipitation. – Describe the annual distribution of precipitation. – Locate these stations on a map showing the climatic regions. 6.2 Point out that the amount of sunlight received by the polar regions varies according to the position of the Earth on its orbit during the year.
Polar vegetation	Under these severe climatic conditions the ground remains almost permanently frozen and trees do not grow. These are the lands of the permafrost and the tundra.	6.3 Based on descriptions and pictures of the polar regions, describe the characteristics of polar climates. 6.4 Based on descriptions and pictures of the polar regions, describe the natural vegetation of these regions. 6.5 Define the following terms: tundra, permafrost, moss, lichen. 6.6 Investigate and then identify some plants and animals of the polar regions. 6.7 Investigate and then describe the customs of the people living in the polar regions.

Content	Details on the Content	Suggested Teaching/Learning Activities
Mountain climates Mountain vegetation	Temperatures decrease at higher altitudes due to the fact that the rarefied air absorbs and retains less heat from the sun. In mountain areas vegetation varies with altitude. The agricultural lands of the lower elevation are topped by the broadleaf forest and, in succession, the coniferous forest, pasture lands, permanent snow or ice.	7. Show how the climate and the natural vegetation of mountain regions are interrelated. 7.1 Recall the connection between altitude and temperature (See Objective 4.3.1, No. 5, p. 139). 7.2 Review the location of alpine glaciers (See Objective 4.2.2, No. 5, p. 128). 7.3 Review the mechanism of relief rainfall (See Objective 4.3.1, No. 6, p. 140). 7.4 Based on pictures of mountain vegetation, describe the gradual change in vegetation with altitude. 7.5 Using a sketch, compare the gradual change in vegetation with latitude (North America) and with altitude (a side of the Alps). 7.6 Investigate and then identify some plants and animals of high altitude regions. 7.7 Investigate and then describe winter and summer activities in high mountain areas. 7.8 Define "alpine pastures." 8. *Synthesizing Activity* Sum up the main characteristics of the different climatic regions in a table. An example of such a table is given on the following page.

TABLE OF CHARACTERISTICS OF THE DIFFERENT CLIMATIC REGIONS

		Geographical location (latitudes)	Summer mean temperatures	Winter mean temperatures	Natural vegetation	Types of trees and plants	Types of animals	Specific activities
HOT ZONE	Equatorial climates							
	Tropical climates							
	Desert climates							
TEMPERATE ZONE	Mediterranean climates							
	Oceanic climates							
	Continental climates							
COLD ZONE	Polar climates							
	Mountain climates							

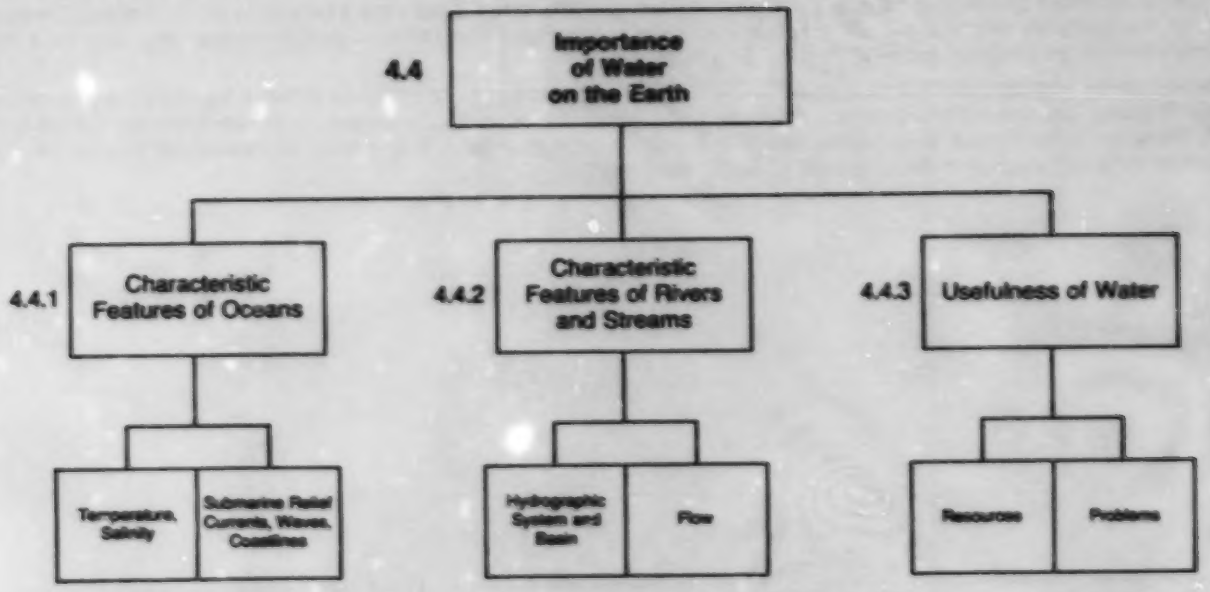
Unit 4.4

Terminal Objective **4.4 To show the importance of water on the Earth.**

Intermediate Objectives:

4.4.1 To identify some characteristic features of the ocean.
4.4.2 To identify some characteristic features of rivers and streams.
4.4.3 To discuss the usefulness of water.

ORGANIZATION OF THE CONTENT



HOW TO TEACH UNIT 4.4

Water is one of the most important of the components of the Earth's surface in terms both of quantity and usefulness. In the first objective the pupil learns that the oceans cover over two-thirds of the planet's surface and contain most of the water available on earth. It is advisable at this point to review the information on climates covered in the preceding unit so as to enable the pupil to understand how the temperature and salinity of ocean waters vary with latitude. Similarly, to explain the relief of oceans, Ur...s 4.1 and 4.2 of this module should be reviewed. In contrast with the continents, the oceans have three different types of movements: waves, tides, and currents. It will be easier for the pupil to understand the process of coastal erosion in both low and high coastal areas if, through the earlier study of erosion by running water, he has grasped how effective water is as an erosive agent.

Less important in terms of quantity but still considerable is the amount of running water on the Earth's surface. The river systems crisscrossing the continents often drain vast regions, hence their sometimes significant volume. These hydrological concepts and facts should be related to those concepts and facts pertaining to climate and relief studied earlier. For instance, it would be pertinent to associate the large flow of equatorial rivers with the abundant rainfall in those regions. Similarly, it will be necessary to introduce certain concepts and facts pertaining to relief when studying the drainage basin of a river system, which is an essential factor in the flow of a river.

Water is important not only because it covers most of the Earth's surface but also because of the many resources it provides. Several of these resources are extensively developed, sometimes to the point of endangering the environment. On the other hand, there are other known water resources that are still underdeveloped. It is necessary, therefore, to adopt certain measures for a more efficient management of water resources.

UNIT 4.4	**Terminal Objective: 4.4 To show the importance of water on the Earth.**	
	Intermediate Objectives: 4.4.1 To identify some characteristic features of the ocean.	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
Extent of the ocean	Salt waters cover about 71% of the planet's surface. In the southern hemisphere, water covers 81% of the surface, whereas in the northern hemisphere oceans cover 61% of the surface. The Pacific Ocean has an area of about 170 000 000 km², roughly one third of the Earth's surface whereas the Atlantic Ocean covers an area of approximately 110 000 000 km². The teacher might want to review several concepts and facts studied in Unit 2.2	1. Review the location and extent of the oceans and seas (Objective 2.2.1). 1.1 Using a map of the world, observe the extent of the different oceans. 1.2 Using a polar projection map, find the hemisphere in which there is more water. 1.3 Compare the areas of the Pacific and Atlantic Oceans. 1.4 Identify the oceans that wash the coasts of our continent, of our country, and of our province. 1.5 Identify a number of seas.
Temperature of ocean waters • Icebergs • Pack ice	The average temperature of the oceans varies with the latitude. Ocean waters are warm at the Equator (27°C) and cold in the polar regions (−2°C). • In the polar regions, the surface of sea water freezes at −20°C, producing icebergs and pack ice. The temperature of the water decreases with depth, as the sun's rays penetrate the water to only a few hundred metres.	2. Understand how a number of factors affect the temperature of ocean waters. 2.1 Using as reference a map showing annual temperatures throughout the world, subdivide the seas and oceans shown on an outline map into three climatic zones (warm, temperate, and cold oceans). • 2.2 Define the terms "iceberg" and "pack ice." 2.3 Answer the following questions with the aid of an appropriate graph: – At what depth is the temperature of equatorial waters similar to the temperature of polar waters? – What is the surface temperature of the sea at the Equator and at the Poles?

• Enrichment activity

Content	Details on the Content	Suggested Teaching/Learning Activities
	This experiment can be carried out on a vacation or camping trip.	2.4 Experiment designed to find out whether water temperature varies as much as air temperature. – *Materials:* thermometer, pencil, notebook. – *How to proceed:* – Find a slow-flowing and shallow stream. – Measure the temperature of the air near the stream. – Measure the temperature of the water. – Repeat these measurement activities at regular intervals (every two hours) over a sufficiently long period (24 hours). – Record these data on a graph: – temperatures on the ordinate (y-axis), – hours on the abscissa (x-axis). – *Questions* – What was the lowest air temperature recorded? What was the highest air temperature? Calculate the temperature range. – What was the lowest water temperature recorded? What was the highest water temperature? Calculate the temperature range. – At what time were the highest and lowest air and water temperatures recorded? – What conclusions can be drawn on the basis of these observations?
	This activity can be carried out at home, using the bathtub. This experiment can serve to illustrate the relation between the temperature and certain movements of ocean waters. Cold water, which has a higher density, tends to move to the bottom.	2.5 *Questions* based on everyday observations: – When you bathe in warm weather does the water feel warmer? – If you bathe in the evening when the weather is cooler, how will the water feel? – On a hot day, is it cooler near the water than in the country? 2.6 Experiment designed to discover one consequence of the differences in the temperature of ocean waters. – *Materials:* a basin of hot water, a glass of cold water, coloring. – *How to proceed:* – Pour the coloring into the glass of cold water. – Pour the contents of the glass into the basin of hot water. – Observe in what direction the cold water flows.

Content	Details on the Content	Suggested Teaching/Learning Activities
	It might be useful to review the activity in Unit 3 which was intended to explain the direction of convection currents.	– *Questions* – Does the cold water move toward the bottom or toward the surface? – Taking into consideration the distribution of temperatures throughout the world, what is the direction of ocean waters in the equatorial regions? What is the direction in the polar regions?
Salinity of ocean waters	Sea water contains a variety of mineral salts, the most abundant of these being sodium chloride.	3. Understand that the salinity of the water in the seas and oceans varies according to certain factors. 3.1 *Questions* based on everyday observations: – Can one die of thirst in the middle of the ocean? – Why is it necessary to stock up on fresh water before taking to the sea? – If you have ever taken a swim in the ocean, what does sea water taste like? – Why is it easier to float in the ocean than in a lake or a pool?
	Salt sea water is therefore heavier and denser than fresh water. Note: This activity is intended to illustrate the link between the salinity of oceans waters and certain movements of the oceans. The density of the water increases with its salinity, and the more saline water tends to sink to the bottom.	3.2 Experiment designed to discover one consequence of the salinity of water. – *Materials:* basin, glass, water, salt, coloring. – *How to proceed:* – Fill the basin with fresh water. – Fill the glass with fresh water, add salt (1 teaspoon) and coloring. – Pour the salt water into the basin. – *Questions:* – Does the salt water rise to the surface or sink to the bottom? – Repeat the same experiment, this time reversing the situation, that is, pouring fresh water into salt water. – What happens to the water's salinity if fresh water is added to the salt water?

Content	Details on the Content	Suggested Teaching/Learning Activities
	Salinity varies with evaporation and the quantity of fresh water received by the oceans and seas. Salinity is high in tropical regions where the rate of evaporation is high and precipitation is minimal (275 grams per litre in the Dead Sea). Salinity is low in rainy regions where the rate of evaporation is low (7 grams per litre in the Baltic Sea). Average salinity is about 36 grams per litre of water.	4. Understand some of the effects of temperature and salinity on seas and oceans. 4.1 Using a graph and the concepts and facts pertaining to the climate learned in Unit 4.3, answer the following questions: – What are the temperature and salinity of the ocean in equatorial regions and in polar regions? – Are the ocean currents flowing from the equatorial regions surface (drift) currents or stream (convection) currents? – Are the ocean currents flowing from the polar regions surface (drift) currents or stream (convection) currents?
•Ocean currents	•Ocean currents are caused primarily by differences in density due to variations in temperature or salinity. These ocean movements are also affected by the prevailing winds of different regions.	• 4.2 Using an outline map of the world, identify the warm and cold currents, and compare their direction with that of the prevailing winds. 4.3 Discuss the influence of ocean currents (cold or warm) on the coastal regions of the continents.
Waves	Wave movements can be compared to the ripple movements created when a rock is thrown in the water. Waves are essentially an up-and-down movement of the water. They topple when they reach the shore.	5. Understand the movement of waves. 5.1 Questions arising from an experiment or observation: – What happens when you throw a rock into the water? – What happens at the spot where the rock falls? – What happens on the shore? – What do you notice when you take a walk on the beach? – What do you notice if you are on a fishing boat on the open sea? – What happens when you blow on the surface of the water in a tub?
Swells	In the open ocean, the wave motion, amplified by the wind, is transformed into swells.	5.2 Define the following terms: wave, swell.

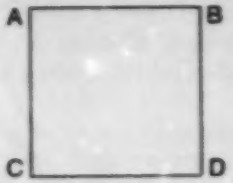
Content	Details on the Content	Suggested Teaching/Learning Activities
• Tides	• The level of the sea varies during the course of the day. These alternate risings and fallings of the water level on the coast are called tides.	6. Explain and illustrate the movement of the tides. 6.1 Questions arising from an experiment or the observation of photographs: – If you build a sand castle near the water on the beach, will it last more than a day? – Compare photographs showing a coast at high tide and at low tide. • 6.2 Compare the gravitational pull of the planets on the seas and oceans to the attraction of a magnet. • 6.3 Explain the movement of the tides with the aid of a sketch.
Coast Shore Coastline Coastal erosion Cliffs	Coast, shore, coastline, are different terms that refer generally to the area where the ocean and the land come into contact. The action of the waves constantly erodes the steep coastlines, cutting away at the base and hurling back stones and rock fragments at the rock face. With the passing years the rock fragments are transformed into round pebbles, gravel, and sand.	7. Describe the effects of the movements of the ocean on the coastline. 7.1 Look up the definition of these terms: coast, shore, coastline. 7.2 Using a variety of pictures, distinguish between low-lying coasts and steep coasts. 7.3 Identify some of the actions of waves on the coast during a storm. Examples: bridges and dams pulled down, scattered debris, etc. 7.4 Describe the action of waves on a steep coastline, drawing a sketch to illustrate. *Questions* – How was the cavity at the bottom of the cliff dug out? – Why doesn't that cavity appear higher up on the cliff? – What do you think will happen to the top of the cliff? – What happens to the sections detached from the cliff? – What will happen to houses built on a cliff?

• Enrichment activity

Content	Details on the Content	Suggested Teaching/Learning Activities
Beaches Offshore bars	Waves and coastal currents carry and deposit eroded materials off the coast. Beaches and offshore bars are among the different landforms made through deposition by currents and waves. In Florida some offshore bars have become important vacation and recreation spots.	7.5 Describe the action of the waves on a coastline, drawing a sketch to illustrate. – Where does the sand deposited on the beach come from? – Identify different types of deposits made by waves and currents. 7.6 Collect a variety of photographs of Florida showing what use is made of the lagoons and offshore bars in the region. 7.7 Investigate the effects of a hurricane on flat coastal regions. 7.8 *Synthesizing Activity* Using topographic maps and aerial photographs, identify coastal highlands and coastal lowlands.
Relief of the oceans: continental shelf, continental slope, abyssal plain, ocean deep, ocean range	The relief of the ocean floor is relatively unaffected by erosion. Rather, it is the process of marine deposition that modifies and softens the features of the relief. The relief of the ocean floor includes: the continental shelf and the continental slope, which are an extension of the continents; the abyssal plain, where ocean deeps and ocean ranges are found.	8. Describe the relief of the oceans. 8.1 Using a map of the ocean floor, identify the following: the continental shelf, the ocean deeps, the Mid-Atlantic Ridge and the other mid-ocean ridges. 8.2 Using a sketch of the relief of the ocean floor, identify the following: continental shelf, continental slope, abyssal plain, ocean deeps, ocean range. 8.3 Define the following terms: continental shelf, continental slope, abyssal plain, ocean deep, ridge. • 8.4 Using the oceanographic maps produced by *National Geographic*, identify certain characteristics of the ocean floor. • 8.5 Using a picture or a sketch, describe the techniques used for sounding ocean depths with acoustic sonars or ultrasound devices.

UNIT 4.4	**Terminal Objective: 4.4 To show the importance of water on the Earth.**	
	Intermediate Objectives: 4.4.2 To identify some characteristic features of rivers and streams.	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
The water cycle Running water River system Source Tributary Mouth Drainage basin	When rain reaches the earth it may soak into the ground, collect in a particular spot, or run off to help to form ground water, lakes, rivers, and streams. Run off water and springs feed streams of all sizes. Streams collect to form rivers, which in turn join to form bigger rivers. A river system is formed by a river and its tributaries. The area drained by a river and its tributaries is known as a drainage basin. The boundaries of a river basin are determined by the line that links the source of the river and the sources of each tributary.	1. Identify the origin of rivers and streams. 1.1 After a heavy rain what happens to the water that falls on the ground? 1.2 Transfer these observations on the scale of the continent to describe the origin of ground water, lakes, streams, and rivers. 2. Describe the different categories of running water. 2.1 Using a sketch of a river system, identify: – the source; – the mouth; – the main river; – the tributaries. Identify the boundaries of the river basin. 2.2 Look up the definition of the following terms: tributary, source, mouth, system, basin. 2.3 Using a topographic map of the region, outline the river system and identify its components. • 2.4 Using a hydrographic map of Québec, outline the boundaries of the drainage basin of a river. • 2.5 Using a map showing the drainage basins of Québec and Canada, identify the three major drainage basins.

• Enrichment activity

Content	Details on the Content	Suggested Teaching/Learning Activities
Volume	The volume of a river or stream is the amount of water that flows past a given spot in one second. Suggested sketch:  A great variety of similar exercises can be devised by simply changing the numbers.	3. Explain and illustrate the concept of volume. 3.1 Review the concepts of volume, speed, and slope covered in Objectives 4.2.2 and 4.2.3. 3.2 Based on an appropriate sketch, calculate the volume of a stream represented by the letters A B C D. *How to proceed:* – The stream's width (CD) is 1 metre. – The water's height (BD) is 1 metre. – The water at C' or D' flows over a distance of 1 metre in one second past points C and D. – The quantity of water that flows in one second through the opening ABCD is equivalent to a cube of 1 metre in length and a volume of 1 cubic metre. – The volume of this stream is therefore 1m³ per second.
• Regime	• While the pupil does not have to learn the concept of regime, he should understand that, particularly in our climate, the volume of rivers and streams varies with the seasons. The volume of a stream or river can be affected not only by the slope but also by the nature of the vegetation and the soil of the region through which it flows.	• 3.3 With the aid of data representing the mean annual flow of various rivers (see *Canada Atlas*, p. 20), identify the month when the volume of the following rivers is highest: Eastmain, Ottawa, St-Jean, St-Lawrence, Assiniboine, and Fraser. 3.4 Questions designed to help the pupil understand the fact that the volume of streams and rivers varies with the seasons: – Have you ever walked in the bed of a stream or of a river in summer? Could you do it any time during the year? – When do floods occur generally? Why? 3.5 Using two pictures, one showing a river flowing through a plain and the other a river flowing through a mountain region, tell which terrain is more likely to cause the volume of the river to increase in the spring. 3.6 Using pictures showing a wooded area and agricultural land, tell in which region the volume of streams and rivers would be greater after a rainstorm. 3.7 Using pictures showing a sandy field and a clayey field, tell in which terrain water will run off more easily.

UNIT 4.4	**Terminal Objective: 4.4 To show the importance of water on the Earth.**	
	Intermediate Objectives: 4.4.3 To discuss the usefulness of water.	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
Water resources	Earth's waters provide a variety of important biological resources. They are an important source of food for human and animal consumption, and form the basis of a variety of industries and trade activities.	1. Conduct an investigation at a fish store or at the fish counter of a supermarket in order to identify: – the different types of fish that are sold – where they come from. Locate the places of origin of the different types of fish on a map of the world. 2. Using a variety of government publications, draw up a list of the types of fish that are the most popular on the North American market. Locate their places of origin on a map of the world.
Fishing zones	The types of fish found in the northern seas are not as varied as those found in tropical waters. However, their commercial exploitation is made easier by the fact that they travel in schools.	3. Using a map showing the major fishing zones, identify the seas and oceans where they are located. Determine whether these fishing zones are located near the world's areas of population concentration (see Objective 2.2.2). • 4. Explain the existence of a Canadian fishing zone in the Atlantic off the coast of Newfoundland: – Locate this fishing zone on a map of Canada. – Is it located above the continental shelf or above the abyssal zone? – Locate the Gulf Stream and the Labrador Current. • 5. Show a film on fishing and explain the difference between commercial fishing and sport fishing.

• Enrichment activity

Content	Details on the Content	Suggested Teaching/Learning Activities
Mineral resources	The oceans contain several minerals, such as salt, magnesium, and bromides, which are extracted on a commercial scale. In addition, exploration of the ocean floor has revealed the presence of manganese nodes which have been successfully brought to the surface thanks to modern technology. Oil today is the most important of the natural resources found in the continental shelves.	6. Based on a description of the process used to convert sea water into drinking water, identify the results of such an undertaking. In what part of the world are salt marshes possible? What are the favorable factors? 7. Based on a case study or a film about off-shore exploration and drilling for oil (the North Sea, the Gulf of Mexico, the Arctic), describe these activities.
Energy resources	The tidal force of the sea is used to produce hydro-electricity.	8. Using a map showing Québec's hydro-electric network, identify the rivers on which dams have been built.
Tourist attractions	Beaches, lakes, rivers, and streams are natural tourist attractions.	9. Identify a number of tourist areas where the presence of water is the prime attraction. 10. List some water sports. 11. Describe the activities that take place by a lake with which you are familiar.

Content	Details on the Content	Suggested Teaching/Learning Activities
Drinking water	There can be no water shortage on the Earth, for the amount of water on the planet has remained the same since the beginning. However, due to the growth of the world's population and to economic development, water consumption has increased and water pollution has become a real problem. Generally speaking, then, problems concerning water resources are basically management and distribution problems.	12. Questions: – Do a summary review of the preceding learning activities in order to show the usefulness of water. – Could there be a water shortage on a world scale? Why? 13. Identify cases of water shortage. Identify a number of measures that can be taken to deal with such cases. 14. Identify cases of water pollution. 15. Identify a number of measures which every individual can take to conserve water. 16. Collect a number of newspaper articles about the Québec government's efforts to clean up the rivers and lakes of the province.

Module 5

ELEMENTS OF HUMAN GEOGRAPHY

MODULE 5

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INSTRUCTIONAL MATERIALS

Map showing world population density.
Map showing languages spoken around the world.
Map showing religions practiced around the world.
Appropriate documentation for the case studies suggested in Unit 5.3.

MODULE 5

ELEMENTS OF HUMAN GEOGRAPHY

GENERAL OBJECTIVES: **UPON COMPLETION OF THIS MODULE, THE PUPIL SHOULD UNDERSTAND THE PRINCIPAL ELEMENTS OF THE HUMAN ENVIRONMENT.**

Terminal Objectives:

5.1 To identify some factors which characterize the world's population.

5.2 To distinguish among different types of settlements.

5.3 To establish the relationship between the physical and human aspects of an environment.

OVERVIEW OF MODULE 5

This last module of the General Geography course focuses on the principal elements of human geography. Some of these, which have been touched upon previously, are covered in greater detail in this module. The first unit is concerned with the factors pertaining to the diversity and migratory movements of the world's population. In the second unit the pupil studies different types of settlements. He learns first to distinguish rural areas from urban areas, and then to identify other types of settlements. In the third unit the pupil examines the different ways in which the physical and human features of a particular environment are interrelated. The pupil is encouraged to examine, by means of a concrete example, how man has adapted to a specific environment whether that environment is hot, temperate, or cold. For this purpose several case studies of different areas of the world are suggested in the Guide. A single one of the examples suggested below or any other example considered pertinent will be sufficient to enable the pupil to achieve the terminal objective.

For the study of a hot environment:
- Primitive life in the Amazon forest;
- Rice cultivation in China;
- The Tuaregs of the Sahara.

For the study of a temperate environment:
- The Argentinian pampa;
- The city of Vancouver.

For the study of a cold environment:
- The life of the Inuit.

Finally, in order to help the pupil to understand the principal features of the human environment through this module, it is recommended to encourage the indirect observation of distant geographical realities by means of pertinent printed and audiovisual materials.

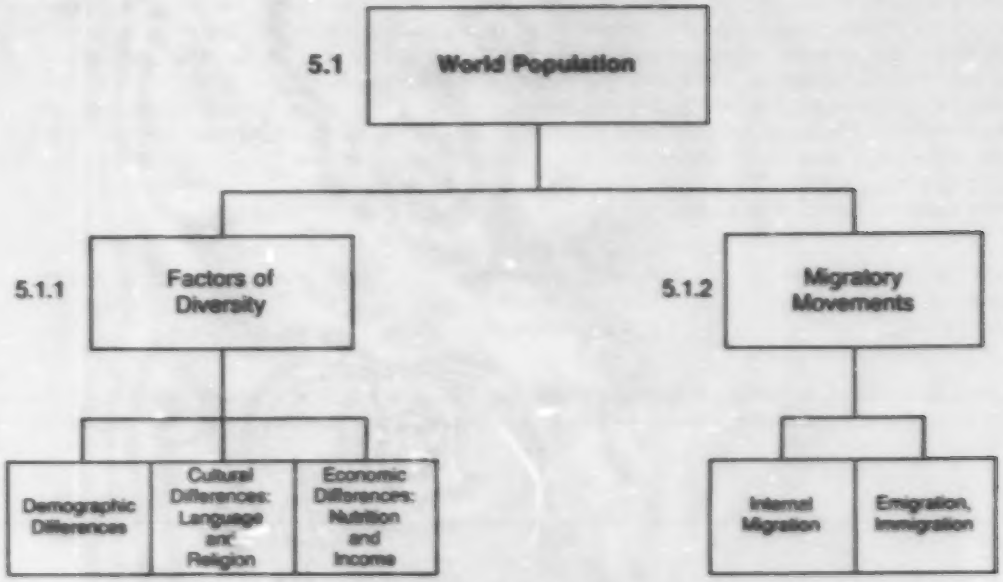
UNIT 5.1

Terminal Objective **5.1 To determine some factors which characterize the world's population.**

Intermediate Objectives:

5.1.1 To identify some factors related to the diversity of the world's population.
5.1.2 To determine the main migratory movements of the population.

ORGANIZATION OF THE CONTENT



HOW TO TEACH UNIT 5.1

While the world's population can be studied from several angles, in Secondary I the focal points will be its diversity and mobility. The pupil should understand that the population of the world is diverse in terms of its distribution and growth. He should also reflect on its cultural diversity by examining the main features of the world economy, the differences in food consumption and production and in incomes in the different areas of the world.

In studying the mobility of the world's population the pupil will consider the main migratory movements of the population. Migratory movements within countries will be examined first by means of such examples as rural migration and seasonal and daily migration for work and recreation. Finally, as regards external migration, it is suggested in this unit that a distinction be made between emigrants and immigrants.

Because several of the underlying concepts used in this unit are relatively abstract, it is strongly recommended that examples drawn from the pupil's environment be used as often as possible, as well as appropriate visual aids.

UNIT 5.1	**Terminal Objective: 5.1 To determine some factors which characterize the world's population.**	
	Intermediate Objectives: 5.1.1 To identify some factors related to the diversity of the world's population.	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
Demographic diversity	*Demographic diversity:* Demographic diversity can be considered from two perspectives: the unequal distribution of settlement in the world and the unequal growth of the different human groups.	1. Explain and illustrate the unequal distribution of the world's population. 1.1 Using a variety of visual aids, compare a desert settlement and a big city. 1.2 Using a variety of visual aids showing different human environments, identify the different factors that make these environments hospitable or inhospitable to human beings.
Distribution, concentration, and centers of population	*Unequal distribution of population:* The pupil should understand first that the world's population is concentrated mainly: in the Northern Hemisphere (almost 90%); between 20° and 60° latitude; in five main centers of population, which have already been identified in Objective 2.2.2. These densely populated areas correspond generally to plain regions, river valleys, and particularly to deltas.	1.3 Review the major areas of concentration of the world's population (Module 2, Objective 2.2.2): high density areas, most populous countries. 1.4 Using appropriate maps, identify the relief, climate, and vegetation which correspond to the areas identified in Activity 1.3. • 1.5 Investigate the historical factors which explain the high population density of the eastern part of the United States and Canada and of the Saint-Lawrence valley.
High density	• These regions sometimes have a population density of over 1000 inhabitants per square kilometer.	• 1.6 Using data relative to the surface area and population of heavily populated regions or countries, calculate the population density of these particular areas.

Content	Details on the Content	Suggested Teaching/Learning Activities
Dispersion	The pupil should understand that about two thirds of the land is very thinly populated. Thus in both the cold and hot deserts as well as in the equatorial regions and the high mountain regions, the population is dispersed.	1.7 Using a map showing the world population's density, identify regions where the population is dispersed and regions that are uninhabitable. 1.8 Investigate the different factors that can explain the low population density or the total absence of population in certain regions.
Low density	• These regions sometimes have a population density of fewer than 1 person per square kilometer. On the other hand, it should be pointed out that man has adapted to difficult environments and in many cases transformed inhospitable environments.	• 1.9 Using data relative to the surface area and population of thinly populated regions or countries, calculate the population density of these particular areas. • 1.10 Compare the population densities of different areas or countries of the world. 1.11 Illustrate a low population density and a high population density by means of diagrams. 1.12 Give a number of examples of man's adaptation to different environments. 1.13 Identify a number of human activities which correspond to different living environments.
Population growth	The pupil should understand from the start that the world's population has been growing at a very fast pace in the last few centuries.	2. Explain and illustrate the uneven growth of the world's population. 2.1 Using a table showing the growth of the world's population, calculate how many years it took for the population to reach 1, 2, 3, and 4 billion inhabitants respectively.

• Enrichment activity

Content	Details on the Content	Suggested Teaching/Learning Activities
Industrialized countries Third World	It should be explained that this growth does not take place simultaneously in all regions. Whereas the populations of the industrialized countries of Europe and North America had grown enormously in the 18th and 19th centuries, the rate of growth of these populations in the 20th century has slowed down considerably. On the other hand, it is in this century that Third World countries have experienced a real population explosion.	• 2.2 Investigate the reasons behin the slow rate of growth of the world's population prior to 1850. 2.3 Given the data relative to the growth of the population of each continent, identify the continents whose populations have increased the most. 2.4 Using graphs and pertinent data, compare the evolution of the populations of Canada and China (or Mexico) since the last century. 2.5 Investigate the causes of the population explosion in Asia, Latin America, and Africa, in the 20th century. • 2.6 Using graphs and pertinent data, compare the evolution of the birth rate in Canada and in China (or Mexico). • 2.7 Using graphs and pertinent data, compare the evolution of the death rate in Canada and in China (or Mexico). 2.8 Compare the evolution of life expectancy in Canada and in China (or Mexico). 2.9 Investigate the consequences of higher birth rates and lower birth rates in Third World countries. 2.10 Compare the percentage of young people (20 years old or less) in the populations of Canada and China (or Mexico).
Cultural diversity	*Cultural diversity:* The cultures of the different peoples of the world differ in many respects. Among the many factors indicative of cultural diversity the course focuses on the diversity of languages and religions among the world's peoples.	3. Observe the different ways of life of the world's peoples. • 3.1 Find pictures of the types of dwellings built by different peoples. Locate these peoples on the map of the world. Describe the materials and shape of these dwellings. Make the connection between the dwellings and the physical environment. • 3.2 Find pictures of the types of clothes worn by different peoples. Locate these peoples on a map of the world. Explain how these different types of clothes fit the different physical environments.

Content	Details on the Content	Suggested Teaching/Learning Activities
•Ways of life •Habits and customs	•The pupil should be made aware that different peoples have different ways of life depending on their particular environments.	• 3.3 Find pictures illustrating foreign habits and customs (foods, fires, dances, songs, etc.). Locate their countries of origin. • 3.4 Ask an immigrant to describe a festival, a wedding, etc. in his/her country of origin. • 3.5 Ask an immigrant to compare the habits and customs of his/her country of origin with those of the host country. • 3.6 Describe a variety of customs which you have observed on a trip abroad.
Languages	It is not necessary to explain how languages are classified into major linguistic families (Indo-European languages, Uralo-Altaic languages, Sino-Tibetan languages, etc.). The emphasis should be, rather, on the geographical and numerical distribution of the major languages. The pupil should be made aware that a particular language may be spoken in several countries, and that several languages may be spoken within the same country.	4. Explain and illustrate the diversity of the languages spoken throughout the world. 4.1 Locate the areas where the major languages are spoken on an outline map. Identify the countries. Indicate their population. 4.2 Find out in what countries English or French is spoken and which countries have more than one official language. 4.3 Do some research to find out what languages are spoken in the Montreal metropolitan area. How can this situation be explained? • 4.4 Find the words for "father" and "mother" in several languages. Notice the similarities between these words in the Romance languages and in the Germanic languages.
Religions	After identifying the major religions the pupil should find out with the aid of a map of the world how they are distributed geographically. He should then identify the main features of these religions and consider their influence on the way of life of their practitioners.	5. Explain and illustrate the diversity of the religions practiced throughout the world. 5.1 Using a map showing where the world's major religions are practiced, identify those that are the most widespread. Identify the corresponding countries. 5.2 Find the countries in which Christianity is the majority religion.

• Enrichment activity

Content	Details on the Content	Suggested Teaching/Learning Activities
		• 5.3 Using pictures and appropriate descriptions, compare the places of worship, rites, cults, and beliefs of the major world religions. • 5.4 Do some research to find out about places which are the object of pilgrimage by the followers of the major religions. 5.5 Identify certain Québec customs which are rooted in religious traditions. 5.6 Identify certain customs found among other peoples which can be linked with their religious traditions. 5.7 Ask an immigrant to describe the celebration of a religious festival or ceremony in his/her country of origin.
Economic diversity Standard of living Per capita income Per capita food consumption	*Economic diversity:* The pupil has already been made aware of differences in incomes and standards of livir g in his community. He should now be made aware that these differences are even sharper at the international level. Just as he knows where the poor neighborhoods in his community are located, he should know where both rich and poor countries are located in the world. Te begin explaining underdevelopment, two criteria among others, specifically, per capita income and food consumption, might serve to determine the level of development of a country.	6. Explain and illustrate the diversity of standards of living among the peoples of the world. 6.1 Using a map showing per capita incomes in the different countries of the world, identify the countries with a per capita income over 1 000,00$ and those with a per capita income of less than 1 000,00$. 6.2 Identify the ten countries with the highest per capita income and the ten countries with the lowest per capita income. 6.3 Compare the *natural resources* of a rich country (or group of countries) with those of a poor country. 6.4 Compare the economy (agriculture, industries, etc.) of a rich country with that of a poor country. Make the connection between the natural resources of a country and certain aspects of its physical environment (soil, climate, etc.). 6.5 Compare in a general way the agricultural production of a Québec farm to that of the subsistence farming practiced in several practical countries. Compare the conditions of production: tools and equipment, techniques, fertilizers, etc.

Content	Details on the Content	Suggested Teaching/Learning Activities
Quality of life	The quality of life in countries with a high standard of living cannot, however, be taken for granted. Other factors, such as level of pollution, urban crowding, etc., might be highlighted in order to help the pupil understand better. In a general way, a high population density results in certain pressures within the living environment to which people adjust as well as they can. The activities suggested here should encourage the pupil to be more tolerant toward those that are different from him.	• 6.6 Compare a typical industry of a rich country to the type of industry generally found in poor countries. 6.7 Compare the diet of a person living in a rich country to that of a person living in a poor country. 6.8 Using a table showing energy output for different types of work, discuss the following sentence: "Because people are undernourished they do not have the strength to work, and because they do not work enough they do not have enough to eat." 6.9 Discuss the following sentence: "Poverty is easier to bear in the sun." 6.10 Compare a list of essential goods needed in a country with a cold climate with a list of essential goods needed in a country with a warm climate. 6.11 Explain and illustrate a number of environmental problems related to the density of the population. 6.12 Explain and illustrate by means of examples why it is important to respect the different ways of life of the peoples of the world.

• Enrichment activity

UNIT 5.1	**Terminal Objective: 5.1 To determine some factors which characterize the world's population.**	
	Intermediate Objectives: 5.1.2 To determine the main migratory movements of the population.	
Content	**Details on the Content**	**Suggest Teaching/Learning Activities**
Migrations Internal migrations International migrations	The pupil should first understand that migration refers to the movement of individuals or groups of people from their place of residence to another region or country. Movements from one region to another within the same country are known as internal migrations, whereas movements from one country to another are called international migrations. Among the many factors that cause people to move permanently inside a country, the attraction of cities for the rural population and the opening of new regions are worth mentioning.	1. Explain and illustrate the concept of migration. 1.1 Compare human migration to the migratory movements of animals. Examples: migration of white geese and bustards in Québec; migration of salmon on the coasts of British-Columbia; migration of the wild animals of the Serengeti plain in Kenya. 1.2 Identify among the pupils in the class: those who have been living in the locality since they were born; those who were born somewhere else in the province; those who were born somewhere else in the country; those who were born in another country. In each case, identify the region or country of origin and indicate whether it is a case of internal or international migration. 1.3 Ask the pupils if they know any individuals or families who have left the region. In each case, identify the host region or country and indicate whether it is a case of internal or international migration. 1.4 Based on data pertaining to internal migration in Canada, identify the provinces with the largest number of arrivals and those with the largest number of departures. 2. Identify some of the causes of internal migration. 2.1 Ask the city pupils where their parents were born or ask the country pupils whether they have relatives (brother, sister, aunt, uncle) living in the city. Find out the main reason behind this migration.

Content	Details on the Content	Suggested Teaching/Learning Activities
Migrations: – daily, – weekly, – annual, – etc.	The daily commuting of workers between their work place and their home can also be considered a type of migration. Similarly weekend travel can be considered a form of migration.	2.2 Based on appropriate date, compare the evolution of Québec's rural and urban populations. 2.3 Compare the proportion of the rural population in Québec in 1925, 1950 and 1975. • 2.4 Highlight some of the problems caused by rural migration in developing countries. Examples: unemployment, development of slums, etc. 2.5 Identify the regions in Québec where there has been a large influx of manpower in recent years. Identify the projects in progress. • 2.6 Based on appropriate data, identify the Canadian province that receives the largest number of immigrants. Find out why this is so. • 2.7 Compare the conquest of the Canadian West, the opening of Siberia, and the push toward the interior in Brazil. 2.8 Compare the traffic on a suburban street to the traffic on a downtown street at different times during the day. 2.9 Describe the weekend traffic (weekly ebb and flow).
	People leave their country for a variety of reasons, some personal (a warmer climate, a better job, etc.), others arising from compelling circumstances (war, famine, persecution, etc.).	3. Identify some of the causes of international migration. 3.1 Investigate the reasons why many Quebecers settle in Florida. 3.2 Investigate why many immigrants settle in Montreal. 3.3 Give some examples of Quebecers who have left to live elsewhere. Indicate the reasons why they left. 3.4 Investigate the reasons why the French originally came to New France. 3.5 Do some research to find out how and by whom the United States and Australia were colonized.

• Enrichment activity

Content	Details on the Content	Suggested Teaching/Learning Activities
Emigration Immigration Emigrant Immigrant	The pupil should be able to make the distinction between the terms "emigration" and "immigration," and between the words "emigrant" and "immigrant."	4. Make the distinction between emigration and immigration, and between emigrants and immigrants. 4.1 Look up the definition of the above terms in the dictionary. 4.2 Identify the nationality of the different groups of immigrants settled in Québec. 4.3 Based on reports of current events, give examples of arrivals of groups of immigrants. Identify their countries of origin. 4.4 Highlight the contribution of immigrants to the development of Québec, Canada, and some other countries in the world.

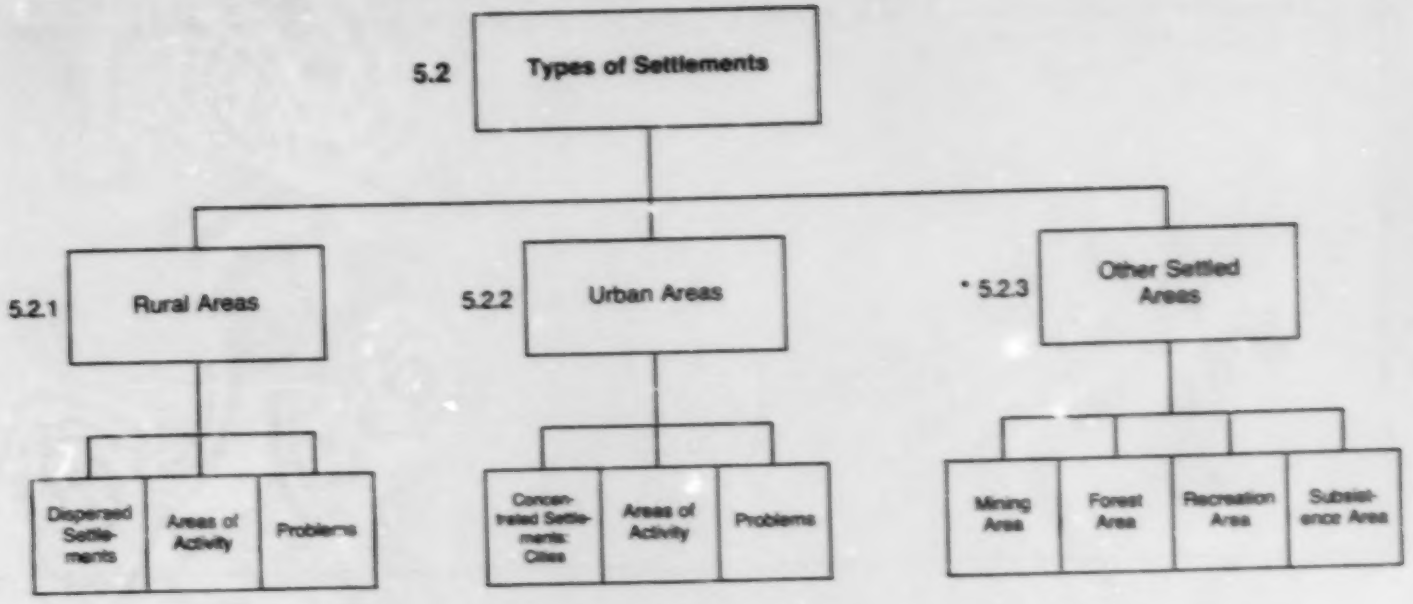
UNIT 5.2

Terminal Objective **5.2 To distinguish among different types of settlements.**

Intermediate Objectives:

5.2.1 To describe the characteristics of rural areas.
5.2.2 To describe the characteristics of urban areas.
*5.2.3 To identify other types of settlements

ORGANIZATION OF THE CONTENT



* Objectives marked with an asterisk are optional.

HOW TO TEACH UNIT 5.2

In the preceding unit a number of factors indicative of the diversity of the world's population were highlighted. In this unit, the focus is once again the diversity of the population particularly in terms of the different ways of occupying and organizing the land. A distinction is made between rural and urban areas, and other types of settlement are identified. It is important to highlight the particular characteristics of each type of settlement so as to clearly differentiate between them. Thus, generally the dispersion of the population in rural areas should be contrasted with its concentration in urban areas, and an effort should be made to relate the activities typical to each area to the characteristics of each type of settlement. For instance, the pupil should understand that agriculture, the main economic activity in rural areas, requires more space than industry does in the cities. Similarly, he should realize that the amount of space used for agriculture varies according to the different types of agriculture practised throughout the world. Rural and urban environments can also be distinguished on the basis of their respective problems. Some of these problems have to do with the physical environment, while others are related to the activities that take place in these areas.

Certain types of settlements are linked to the development of certain land resources. To explain and illustrate these types of settlements, in this part of the program a distinction is made between mining, forest, recreation, and subsistence zones. Appropriate examples and case studies should help the pupil get a better grasp of the different factors which characterize human occupation of the land.

UNIT 5.2	**Terminal Objective: 5.2 To distinguish among different types of settlements.**	
	Intermediate Objectives: 5.2.1 To describe the characteristics of rural areas.	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
Type of settlement	The pupil should observe that most of the population in the regions between the Tropics is involved in agricultural activities. The pupil should note that about 75% of the world's population is employed in agriculture.	1. Observe the importance of agriculture in the world. 1.1 Using a map of the world showing the distrubution of rural and urban populations throughout the world, identify: - the continents with the highest percentage of the population involved in agriculture; - the continents with the lowest percentage of the population involved in agriculture; 1.2 Using a map of the world showing the structure of occupational activities in the different countries of the world: - identify the countries with more than 50% of their population employed in agriculture; - identify the continents to which these countries belong. • 1.3 Using a map of the world showing the distribution of rural - distinguish the different types of settlement; - observe the place of agriculture.
Forms of agriculture	The pupil should note the diversity of agricultural practices or forms of subsistence, as well as the amount of space required for each of these types of activities.	2. Observe the diversity of the types of agriculture practised throughout the world.
•Subsistence agriculture	With subsistence farming, enough food is produced to feed the farmer and his family. Not much surplus is left for selling or trading.	2.1 Using appropriate pictures, identify the activities depicted and classify them according to the different forms of agriculture: *Suggested illustrations* - Natives of the Amazon forest - Rice field in Asia - Tropical plantation

• Enrichment activity

Content	Details on the Content	Suggested Teaching/Learning Activities
		Activities – Shifting agriculture – Intensive agriculture – Commercial agriculture
•Family agriculture	•Peasant farming is practised primarily to meet family needs. Some surplus, which can be sold, is produced through this type of agriculture.	• 2.2 Using a map of the world, locate the places where the following are practised: – nomadic pastoralism; – cattle ranching; – subsistence farming; – commercial agriculture; – family agriculture.
•Commercial agriculture	•Commercial agriculture produces foods for sales and profits.	
Physical factors	The type of agriculture that is practised is influenced by the interaction of physical and human factors. Among the physical factors that come into play the following should be mentioned: climate, vegetation, soil, and relief. The human factors are primarily certain cultural traditions, the standard of living, the tools and techniques available to the farmer.	2.3 Using a number of pictures depicting a variety of agriculture activities, identify the physical and human factors which influence these activities. 2.4 Using these same pictures, identify some problems arising from these physical and human factors (aridity of the soil, inadequate tools and equipment, etc.).
Dispersed settlement	It should be pointed out that in rural areas human settlements are generally dispersed. Houses are either isolated or grouped into hamlets, villages, rural towns, etc.	2.5 Using appropriate pictures or graphs, compare land use in Québec and in some other country: – Note the size of the fields under cultivation; – Note the structure of the settlements; – Discuss the communication facilities.

Content	Details on the Content	Suggested Teaching/Learning Activities
•Agricultural activities	•Each type of agriculture is characterized by specific activities. Consequently, the different types of agriculture can be identified initially on the basis of the descriptions of the particular agricultural activities associated with them.	• 2.6 Given a brief description of some agricultural activities practised in various parts of the world, relate these activities to specific types of agriculture (subsistence or commercial). On a map of the world, try to locate the places where these activities are practised. *Suggested descriptions* (a) A farm in Québec – Objectives: producing milk and milk products, hay, and meat (pork, veal, beef) for sale. – Surface area: 1 000 hectares of fertile soil. – Manpower and equipment: owner/farmer and less than five employees; modern equipment and machinery. – Production: milk, beef, oats, corn, beets, hay, potatoes. (b) A farm in Thailand – Objectives: producing rice for sale. – Surface area: 15 hectares of irrigated land. – Manpower and equipment: owner/farmer and extended family; simple tools and animal power. – Production: about 900 kg of rice per hectare. (c) A farm in New South Wales (Wagga Wagga region) – Objectives: sheep raising for meat and wool. – Surface area: several thousand hectares of arid land. – Manpower and equipment: owner/farmer and several shepherds on horseback. – Production: 10 000 sheep and about 4,5 kg of wool per sheep.

• Enrichment activity

Content	Details on the Content	Suggested Teaching/Learning Activities
		(d) A farm in India (Assam region) – Objectives: producing tea for export. – Surface area: 1 000 hectares, of which 700 are planted with tea and the other 300 with rice. – Manpower and equipment: 1 000 workers, of whom 60% are hired seasonally for the harvest, and the other 40% work at the processing plant. – Production: 2 000 kg per hectare. (e) The Bushmen of the Kalahari desert – Objectives: hunting and gathering to meet their food needs. – Surface area: vast hunting territory. – Equipment: bows and arrows, digging stick. – Production: daily food needs (game, insects, roots, berries, etc.). • 2.7 Illustrate different types of agricultural enterprises in Québec.
Problems relative to agricultural areas	Among the problems relative to agricultural areas, the following can be mentioned: – urban expansion, – erosion and exhaustion of the soils, – parcelling out of the land into small holdings, – pollution and lack of water.	3. Explain and illustrate certain problems relative to agricultural areas. 3.1 Using an appropriate map, identify the directions of growth of your city over the last ten years, and identify certain changes in land use. 3.2 Using appropriate illustrations, identify a number of cases in which agricultural lands have disappeared. Examples: – expansion of a strip-mining site, of a stone quarry, of a gravel pit; – expropriation of agricultural lands for the purpose of constructing roads, airports (Mirabel), railroads; – construction of recreation sites in rural areas; – erosion of soils; – etc. 3.3 Review certain elements of Module 4 concerning erosion.

Content	Details on the Content	Suggested Teaching/Learning Activities
	It should be pointed out that both natural vegetation and agriculture are dependent on the climate. Thus, the transformation into deserts of vast regions in the American south and North Africa has been attributed to important changes in the climate.	3.4 Using appropriate illustrations, examine various examples of soil erosion. Examples: – the badlands in the southwest of the United States; – the transformation into desert of several square kilometres of arable lands in the Sahel; – gullying of slopes. 3.5 Using appropriate illustrations, identify a variety of methods used to fight erosion. Examples: – reforestation of slopes; – forest cover; – contour ploughing, etc. 3.6 Do some research or interview a farmer to find out the reason for the practice of crop rotation.
	• In the preceding activities the pupil was able to realize that agricultural holdings in different parts of the world are quite varied in size. It is advisable at this point to draw the pupil's attention to the fact that in certain countries peasants do not have enough land to cultivate in order to feed themselves.	• 3.7 Using appropriate documentation, study the methods of land reclamation applied in the polders of Holland and in the Sinai Desert. • 3.8 Read a text or watch a film about the problem of the breakup of agricultural lands into small holdings.

• Enrichment activity

UNIT 5.2	**Terminal Objective: 5.2 To distinguish among different types of settlements.**	
	Intermediate Objectives: 5.2.2 To describe the characteristics of urban areas.	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
Urbanization	The pupil should understand the importance of the phenomenon of urbanization, which developed particularly in the 20th century. This phenomenon has been a pervasive one throughout the Western World, including Québec and Canada. Urbanization is a result of the development of the industrial and service sectors. Rural migration is one of its consequences. *Table A* Evolution % of the Urban Population 1978, p. 104) *Annuaire du Québec* 1941 60,0 1951 64,7 1961 69,9 1966 72,4 1971 73,4 1976 74,3 1981 76,2	1. Make the pupil aware of the phenomenon of urbanization. 1.1 Using a map of the world showing the distribution of the urban population, identify: – the continents with the highest urban population percentage; – the most urbanized countries. 1.2 Recall the areas of the world with a high population density and review the distribution of major cities around the world. (Objective 2.2.2). 1.3 Investigate the factors which brought about the phenomenon of urbanization in the 20th century. Recall a number of aspects relative to the decrease of rural areas. 1.4 Given certain data representing the evolution of the urban population in Québec from 1941 to 1981, construct a graph to illustrate this evolution. (See Table A). 1.5 Using a number of maps showing land use in a given city in different periods, note the expansion of that city.

Content	Details on the Content	Suggested Teaching/Learning Activities
Conurbation	• Urban development results in the proliferation of suburban communities. Urban areas expand in two ways: expansion of a core city through the successive development of outlying areas, or integration of several originally separate expanding towns. Both processes result in an extensive urban area or conurbation. Cities expand not only in terms of their surface area, but also through the development of underground transportation lines and through the construction of tall buildings. Cities, then, encompass the ground, the underground, and the air space.	• 1.6 Using a map showing the evolution of the city of Montreal, identify its different stages of growth in different periods. Identify the original site of the city and the period in which the city experienced its most extensive growth. • 1.7 Using a plan of the city of Paris, identify the different stages of growth of the city. • 1.8 Compare the growth of Montreal with that of Paris. • 1.9 Using a road map or an atlas map, identify the main cities that are part of the Bosnywash (Boston-New York-Washington) conurbation. 1.10 Using a map of the Montreal metro, identify the lines, directions, and terminuses of the metro. Find out which streets the metro lines correspond to. • 1.11 Identify other cities with a metro system. 1.12 Collect postcards of different cities. Compare these cities.
Concentration	Urban areas are characterized by the concentration of population, whereas rural areas have a dispersed population. (Cf. Objective 5.2.1)	2. Relate the concepts of urbanization and population concentration. 2.1 Using the topographic map of Beloeil, compare the concentration of the population in the urban region of Beloeil-St-Hilaire with the dispersion of the population in the rural area between Ste-Madeleine and St-Jean-Baptiste. 2.2 Repeat the preceding exercise with a topographic map of the local area.

• Enrichment activity

Content	Details on the Content	Suggested Teaching/Learning Activities
	• Population density is not the same in the city's core as in the metropolitan region. It also varies from one city to another.	• 2.3 Compare the population densities of different cities. (See Table B)
	Table B Density: Population/hectare City / City Core / Metropolitan Area Calcutta 1 606 69 New York 420 26 London 163 14	
	Site and location are two of the most important factors that are taken into account relative to the foundation of a town or city.	2.4 Investigate the different factors (historical, geographic, economic) that cause the population to concentrate in certain places. 2.5 Organize a simulation game in which, given a particular landscape, the pupils have to select the best site, depending on the period, for a town or a village. 2.6 Given a series of pictures representing, on the one hand, different types of cities, and on the other hand a number of factors that have influenced their development, make the required associations.
	History helps to explain the motives of the founders of a town.	3. Explain and demonstrate the importance of the original site of a town. 3.1 Do some research to find out why and when your town was founded. Is the original reason still relevant today? If not, investigate the factors which contributed to the preservation and development of the town.

Content	Details on the Content	Suggested Teaching/Learning Activities
Site	The site of a city is the physical area in which it is located. The physical characteristics of this location influence the general aspect of the city. • City sites can be classified on the basis of the following physical characteristics: – Sites easily defended, e.g. Québec, Halifax; – Sites convenient for transportation by water, e.g. Montreal, Vancouver; – Sites near land routes, e.g. Calgary; – Sites near natural resources, e.g. Schefferville, Asbestos. • The site of a city can influence its shape: – Cities confined within a valley or backed up against a mountain: linear shape; – Cities built on lowlands: spread out and dispersed.	3.2 Describe the site of your city. Is the site suitable or not? 3.3 Compare the site of your city to that of other cities you know. 3.4 Using a photograph of the city of Québec, describe the site of the city. Find out the original function of this city. 3.5 Repeat the above exercise taking Montreal as an example. 3.6 Using a variety of appropriate maps, compare the sites of different cities. • 3.7 Using a plan of your city and the topographic map of the region, discuss how the site may have influenced the shape of the city. • 3.8 Consider other cities from the same perspective as in the above exercise.
Location	The location of a city is its geographical situation considered within the broader context of the region. Location can be defined as the relationship between the city and the surrounding region.	4. Explain and illustrate the difference between the site and the location of a city. 4.1 Using an appropriate map, locate your city in relation to the region, the province, the country, and the rest of the world. 4.2 Locate your city or locality in relation to other cities (regional metropolis, provincial capital), and in relation to certain communication or transportation routes and facilities (airport, navigable river, railroad, etc.). 4.3 Discuss the impact of the site of the city on its communication and transportation facilities.

• Enrichment activity

Content	Details on the Content	Suggested Teaching/Learning Activities
		4.4 Discuss the impact of the site and location of the city on its development. 5. Identify the different districts of a city. 5.1 Using a plan of the city, identify the different ways in which the land is used, coloring each type of land use a different color.
Residential, commercial, and industrial districts	Cities are generally divided into three districts: residential, commercial, and industrial. These different districts can be identified by certain characteristics: type and density of the buildings, distribution of green spaces, traffic and access routes.	5.2 Using a land use map or a plan of your locality or city, identify the residential, commercial, and industrial districts. 5.3 Identify the characteristics of each district. • 5.4 Using the *Guide d'architecture du Québec*, identify the period in which the buildings in your neighborhood or locality were constructed. • 5.5 Based on information gathered on a field trip or from a city plan, draw a land-use cross-section of an area or street of your city. 5.6 Identify the function of the buildings in the downtown area. Draw a profile of each building and identify the function of each story.
	• This activity is intended to enable the pupil to distinguish among different business districts. The telephone directory in which the different business establishments are listed can be used for this activity.	• 5.7 Classify the business districts of your locality or city. – Locate the business districts on a city plan. – Identify the main access routes. – Draw up a list of the different commercial establishments. – Classify these establishments based on the types of service they offer. • 5.8 Study an industrial park in your locality: – Locate the industrial park on a city plan. – Identify the main access roads. – Identify the different establishments and group them if possible.

Content	Details on the Content	Suggested Teaching/Learning Activities
Activities and functions	The activities that take place in a city make it possible to identify its functions. In a city with a specialized function one type of economic activity is predominant. Such a city usually owes its existence to the presence of a particular site, a specific natural resource, or a combination of a variety of factors.	6. Associate certain types of activities with different sectors of a city. 6.1 Identify activities that are conducted in each part of the city. 6.2 Identify the main economic activity in the city. In which district is it concentrated? Relate this particular activity to a determining factor (site, resource, etc.). 6.3 Give an example of a mining town, a dormitory town, a fortress city, a service town, a university town, a government town. 6.4 Give examples of cities with a nickname. Example: Arvida, Aluminum City. Is this nickname related to the town's function?
Urban problems	The pupil should be made aware first of the problems found in the urban area with which he is familiar, before he can be made aware of problems in other cities. Among the different problems shared by cities in varying degrees, those concerning traffic, housing, and quality of the environment are particularly worth mentioning. Information concerning city traffic can be obtained from the following public organizations: Ministère des Transports, C.T.C.U.M., C.T.C.U.Q., City Hall, etc.	7. Describe some aspects of the traffic problems in big cities. 7.1 Using a city plan, identify the downtown area and the area toward which the major arteries converge. 7.2 Based on appropriate data, identify the busiest streets of the city at different hours of the day. 7.3 Given the appropriate data pertaining to the daily movements of the population, identify the main purpose and destination of these movements as well as the predominant means of transportation. 7.4 Investigate the traffic on a street leading to the downtown area. The following factors should be observed: - the different types of vehicles used, - the variations in traffic volume according to the time of day and day of the week, - the flow the traffic (jams, accidents, etc.).

Content	Details on the Content	Suggested Teaching/Learning Activities
Pollution	While the automobile has contributed much to the development of cities, it could equally contribute to their destruction. Not only is the automobile the means of transportation responsible for the greatest number of deaths, it also increases air pollution as well as the level of noise. Especially when there is a temperature inversion, heavy car traffic causes an accumulation of smog, which affects human tissues.	7.5 Find some pictures or draw your own pictures illustrating city traffic during rush hour. 7.6 Using data obtained from the Ministère de l'Environment or from one of its regional offices, determine the amount of pollution due to motor vehicles (fuel combustion). 7.7 Examine pictures of cities in which multilevel clover leaves are represented. 7.8 Investigate various ideas for decreasing traffic in the downtown area.
Housing crisis	In order to know what kind of neighborhood he lives in, the pupil should be able to identify certain specific criteria or signs.	8. Describe certain aspects of the housing problem in big cities. 8.1 Enumerate some criteria which, in your opinion, make it possible to tell in which category a particular dwelling belongs. Compare your list with the list of criteria approved by the administration of your town. 8.2 Identify certain signs by which a poor dwelling or a low-income neighborhood can be recognized. 8.3 Using a plan of your city, identify its low-income neighborhoods.
Urban renewal	The poorest urban areas are often the target of various urban renewal or reconstruction projects. Several cities around the world have gray areas and low-income neighborhoods. The pupil should be made aware of the existence of this problem.	8.4 Identify some urban renewal or reconstruction projects: objectives, ways and means, results, etc. 8.5 Based on information gathered from photographs of the *favelas* of Rio de Janeiro (Brazil), the shanty towns of Ibadan (Nigeria), and the homeless of Calcutta, identify certain signs of poverty. 8.6 Investigate some causes or factors that explain the existence of such neighborhoods.

Content	Details on the Content	Suggested Teaching/Learning Activities
		8.7 *Discussion subjects:* – What are the minimum necessities for a dwelling in a cold climate and in a warm climate? – How have people adapted their dwellings to the particular conditions of their environment?
Quality of life	The presence of industries in urban areas implies, among other things, jobs, prosperity, a broader tax base, etc. But industries may also be responsible for lowering the quality of the environment through air, water, and noise pollution. The pupil should be made aware of the difficult choices that have to be made in many cases, and of the price that has to be paid to protect the environment. The Japanese example illustrates the problem clearly. In order to ensure an adequate supply of energy resources for its growing industry, Japan has built several petrochemical industrial complexes. Wastes from these plants have polluted the sea and contaminated the fish in Japanese waters.Consumption of the contaminated fish, a major staple in the Japanese diet, has caused a number of illnesses. In addition, in the Tokyo-Yokohama metropolitan region (about 1 000 km^2), some 4 million cars create endless traffic jams and considerable atmospheric pollution. Some 80 000 factories pollute the environment (air, water, soil), hence the deterioration of the environment, a phenomenon called *kogai* by the Japanese.	9. Describe a number of factors which affect the quality of life in cities. 9.1 Identify a number of dangers brought about by the factories in your community. What solutions might be considered? 9.2 Using photographs of the area in East Montreal where the oil refineries are located, and pictures of the Trois-Rivières and Québec pulp and paper mills, identify various pollution problems. 9.3 Consider the example of Japan and identify sources of pollution in urban areas as well as the harmful effects of pollution from these sources.

UNIT 5.2	**Terminal Objective: 5.2 To distinguish among different types of settlements.**	
	Intermediate Objectives: * 5.2.3 To identify other types of settlements.	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
Location of a mining settlement Location of resources	*Mining settlements* To enable the pupil to identify the principal characteristics of a mining settlement, it might be worthwhile to do a comparative study of the towns of Schefferville (Québec) and Kiruna (Sweden). The activities suggested here indicate some of the aspects of the two areas that would be pertinent to compare. Information about these mining settlements can be obtained at the following addresses: La Compagnie minière IOC 1245 Sherbrooke West Montreal, P.Q. Telephone: (514) 849-5636 Lkab S-98186 Kiruna Sweden or Resebyra Reso Mangigatan No 12 Kiruna Sweden	1. Compare the mining regions of Schefferville and Kiruna. 1.1 Locate Québec, Sweden, and the towns of Schefferville and Kiruna on a map of the world. Compare the different latitudes. Locate the Polar Circle. 1.2 Locate the following places in Québec or Sweden: *Québec* – The iron ore deposit in the Schefferville region – Lake Attikamagen – The Labrador Trough – The Sept-Îles port – The Gulf of St-Lawrence – The Québec North Shore and Labrador Railway (Schefferville-Sept-Îles). *Sweden* – The iron ore deposit in the Kiruna region – Lake Tornetrask – The Kjølen Mountains – The Narvik and Lulea ports – The Gulf of Bothnia – The North European Railway Co. – (Narvik-Kiruna-Lulea). 1.3 Compare the climate graphs of Schefferville and Kiruna; compare also the climate graphs of Sept-Îles and Narvik.
Physical environment		1.4 Using a world map showing the different natural vegetation zones, identify the types of vegetation found in Schefferville and Kiruna.

Content	Details on the Content	Suggested Teaching/Learning Activities
Types of mining	Here the teacher should highlight the characteristics of an open pit mine. The following aspects of the two towns could be compared: age, population, surface area, land use. The following aspects could be compared: distance between the port and the mining site, transportation from the mining site to the port, harbor installations and equipment, advantageous or disadvantageous position on the continent.	1.5 Using pictures of the Schefferville and Kiruna mining operations, compare the installations and mining methods. • 1.6 Identify a number of problems related to the mining operations. 1.7 Using pictures and pertinent information, compare the towns of Schefferville and Kiruna. 1.8 Using appropriate maps, compare the harbor installations available at the ports of Narvik and Sept-Îles.
Location of forest industry settlements Physical environment Type of operation	*Forest settlements* A brief study of a British Columbia logging camp or wood processing concern will enable the pupil to identify the characteristics of the forest environment. If the pupil does live in a forest environment, he might be asked to identify certain characteristics of his surroundings. The following features could be observed: – varieties of trees; – types of operations and transportation methods; – marketing; – manpower; – secondary industries.	2. Identify the characteristics of a forest region. 2.1 Locate British Columbia on a map of Canada. Locate the principal forest sites in the province. 2.2 Describe the climate graphs of the Vancouver and Prince Rupert regions. Identify the types of vegetation found in these regions (Cf. Module 4). 2.3 Using pictures of a logging camp or wood processing concern, identify: – the characteristics of the trees that are used; – the operating techniques or conservation measures. 2.4 Using an appropriate map of British Columbia, identify the sea routes and railroad networks of the province, and the forest termini of Vancouver, Prince Rupert, and Prince George. 2.5 Do some research to find out the destination and uses of the lumber and wood products. 2.6 Investigate working and living conditions in forest settlements.

• Enrichment activity

Content	Details on the Content	Suggested Teaching/Learning Activities
Recreational potential at the regional and provincial levels	*Recreation settlements* (local or regional): The pupil should explore the recreational potential of his region first. Then he should be able to identify some of the features that make certain areas in Québec or in other parts of the world attractive as tourist and recreational spots.	3. Identify the characteristics of a recreation settlement. 3.1 Identify outdoor recreation areas in your region where people can go on holidays and vacation. 3.2 Identify the ski resorts, parks, camping grounds, golf courses, and holiday spots in your region. Discuss the accessibility of these places and their impact on the quality of life in your region. Using a map of your region, identify an unsettled rural area which could be made into a recreation settlement. Suggest a number of activities that could take place in such an area. 3.4 Using appropriate maps, identify the different parks in the province. Identify the services offered in one particular park. 3.5 Using the Annuaire du Québec, identify the most popular recreation and sport activities in Québec. 3.6 With the aid of various pertinent publications, identify a number of problems caused by too much tourism. 3.7 Describe a day you have spent or would like to spend in the outdoors. 3.8 Identify a number of tourist areas or resorts on a map of Québec. Indicate their respective attractions. 3.9 Identify a number of popular tourist areas on a map of the world. Indicate the particular attractions of these places.

Content	Details on the Content	Suggested Teaching/Learning Activities
Fragility of a closed economy	*Subsistence settlements* It will be of great benefit to the pupil to study the nomadic life of an African people, the Massai of Kenya, for example, or any other human group which practices a subsistence economy. The pupil should first understand the social organization of the Masai (or of some other group). A closed economy is based on the possession of cattle which are rarely butchered. Animal overpopulation results in a greater erosion or lower fertility of the soils. The ultimate result is a gradual deterioration of the environment and expansion of the desert. Other examples suggested for the study of nomadic life: the Lapps, the Amerindians.	4. Identify the characteristics of subsistence settlements. 4.1 Locate Kenya on a map of the world. Calculate the distance between Kenya and Québec. 4.2 Identify on a map of Kenya the region inhabited by the Masai. 4.3 Using a climate graph and appropriate maps, describe the climate and vegetation of this region. 4.4 Investigate the customs and the economic life of the inhabitants of a Masai village. 4.5 Draw a sketch of the dwellings of the Massi. Identify the type of house, the materials, etc. 4.6 Investigate and identify the wildlife of this part of Africa. Identify the animals that can be a threat to the Masai's cattle.

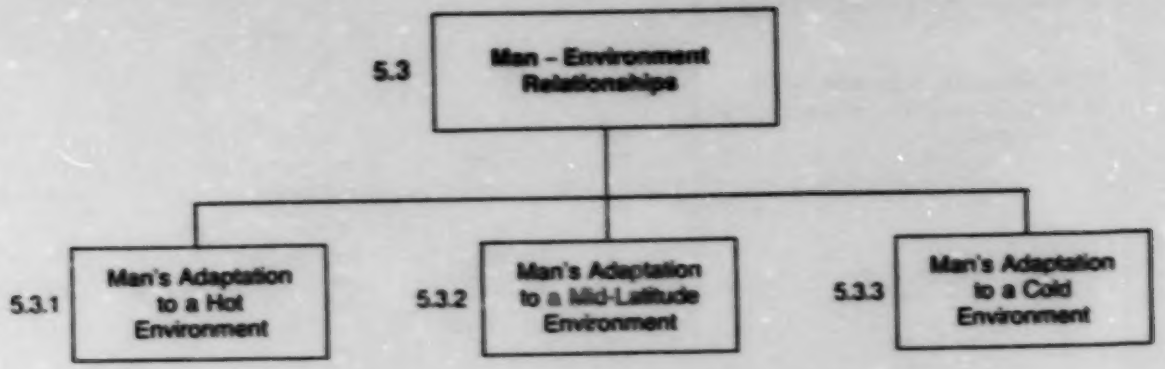
UNIT 5.3

Terminal Objective **5.3 To establish the relationships between the physical an human aspects of an environment.**

Intermediate Objectives:

5.3.1 To show how Man has adapted to a hot environment.
5.3.2 To show how Man has adapted to a mid-latitude environment.
5.3.3 To show how Man has adapted to a cold environment.

ORGANIZATION OF THE CONTENT



HOW TO TEACH UNIT 5.3

This last unit is intended to bring together the basic concepts, ideas, and facts examined in the General Geography course. More specifically, this unit constitutes the very core of the course in that it is designed to enable the pupil to discover how the physical and man-made features of different environments are interrelated. It should be noted that this part of the course contains three objectives dealing respectively with a hot equatorial environment, a temperate mid-latitude environment, and a cold polar environment. These objectives are compulsory. At least one example for each of the three environments to be studied is suggested in the Guide. The teacher can use either the examples provided or *any other pertinent case of his /her choosing* to enable the pupil to attain the terminal objective of this unit. These are the cases suggested in the Guide:

For the study of a hot equatorial environment:
- Primitive life in Amazonia;
- Rice cultivation in China;
- The Tuaregs of the Sahara.

For the study of a temperate mid-latitude environment:
- The Argentinian pampa;
- The city of Vancouver.

For the study of a cold polar environment:
- Innuit life.

To enable the pupil to grasp the links between the different physical and human features of an environment, it is recommended to highlight the concepts and subconcepts that are to be developed in relation to each of the environments studied.

This last unit, which is also the most important, is consistent with some of the basic directions of the course insofar as it enables the pupil to interrelate the different features of an organized environment and to have a comprehensive understanding of such environments.

UNIT 5.3	**Terminal Objective: 5.3 To establish the relationships between the physical and human aspects of an environment.**	
	Intermediate Objectives: 5.3.1 To show how Man has adapted to a hot environment.	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
Location	1. Hot equatorial environments – Suggested case study: Primitive life in Amazonia.	
	It is advisable to begin with an overview of the region to be studied to enable the pupil to have a general idea of its characteristics. The following subconcepts should be highlighted: – Location in Brazil and in relation to Québec; – Identification of neighboring countries; – Latitude of the region under study; – Hydrography of the Amazon basin.	1. Locate the following on a map of the world: – the Americas; – Brazil; – the Pacific and Atlantic Oceans. 2. Using a map of the world: – Locate Amazonia; – Indicate the latitude of Amazonia; – Trace the Amazon River and its tributaries and indicate their names; – Trace the boundaries of the Amazon basin; – Name the countries that have territory in the Amazon basin. – Locate the territory of the Boros between the Japura and Putumayo Rivers.
Climate Vegetation Soils Hydrography	These concepts can be studied separately first and then in combination. A survey of all these elements will enable the pupil to perceive the relationships between the physical and human environments.	3. Based on a number of pictures or on a film about Amazonia, highlight the following aspects of the region: – Climate: temperatures, precipitation; – Vegetation: equatorial rain forest, products; – Hydrography: importance of water, length of the river, volume, delta, risings, floods; – Relief: average elevation of the plain; – Soils: fragility and temporary fertility of the soils; – Human presence: cities, villages, tribes.

Content	Details on the Content	Suggested Teaching/Learning Activities
Population Diet Housing Agriculture Economic activities Social activities Adaptation to the physical environment	The next step is to have the pupil study the way of life of a primitive tribe in Amazonia. The Guide suggests the Boro tribe. While focusing on various details pertaining to the life of this tribe, the pupil should be enabled to understand that the physical environment influences the way of life, customs, housing, and economic activity of these people. The relationship between the physical and human environments should always be the focus of the study.	4. Using a variety of documents: – Identify the customs of the Boros; – Describe the type of houses they live in (materials, shape); – Describe the way of life (community, family); – Identify the resources (sugar, rubber, wood, minerals, oil); – Identify the economic activities (hunting, gathering, fishing) and the social activities. *Questions:* – What are the crops grown by the Boros? How do they cultivate the land? What type of agriculture is that? – What other products do they make use of? 5. With the aid of a relevant text, help the pupil to understand the following: – the difficulties which the Boros have to deal with in their forest environment: – climate; – food, shelter; – hostile neighbors, isolation, advance of civilization; – the solutions, which the Boros apply to each of the problems indicated. 6. Based on the texts read and the films shown earlier, draw a plan or construct a model of a Boro community. 7. *Questions:* – Have the Boros adapted to their living environment? Give some examples. – Which features of their physical and human environments are similar to ours? Which are different? – Do the resources of the environment facilitate Man's adaptation?

Content	Details on the Content	Suggested Teaching/Learning Activities
	2. Warm, Subtropical Environments – Suggested Case Study: Rice Cultivation in China.	
	The focus of this study is the Yangtze Kiang or Blue River flood plain. The Hwang Ho plain could also be examined as a case study of a warm environment if the teacher so decides.	
Location	It is advisable to begin by giving the pupil an overview of the geographical location of the region to be studied, and then to locate that region in a more specific manner inside China.	1. Using a map of the world: – Locate the continent of Asia; – Locate the seas and oceans that wash the shores of the continent; – Trace the boundaries of China; – Locate a number of countries such as the USSR, Japan, North Korea, India, etc; – Distinguish between Taiwan and the People's Republic of China. 2. Using a map of China: – Locate the Yangtze Kiang and its floodplain; – Identify the regions where rice is cultivated; – Locate some big cities along the Yangtze Kiang: Chungking, Wuhan, Nanking, Shanghai; – Indicate the average latitude of this floodplain.
Climate Vegetation Relief Soils Hydrography	Climate, vegetation, soils, and hydrography can be studied separately. However, the links between these different elements should be stressed to enable the pupil to have a comprehensive view of the physical environment under study. Subsequently it should be easier for the pupil to understand how the human and physical environments of the region under study are interrelated.	3. Using pertinent documentation identify the characteristics of: – a tropical monsoon climate: temperatures and precipitation; – the natural vegetation of a tropical region: selva and sparse forest, parkland and savanna; – the relief of a flood plain: average elevation of the plain and horizontal plan of the rice field; – the soils of a flood plain: fragility, loss of fertility during the rainy season, and renewed fertility after floodings; – the hydrography of a flood plain: river, tributaries, delta; – changes in the river's volume between the rainy season and the dry season, risings and flooding problems.

Content	Details on the Content	Suggested Teaching/Learning Activities
		4. Show how the different elements studied in Activity 3 are interrelated: – Using films, slides, and pictures, suggest a number of questions to be discussed, each question concerned with the various ways in which the different elements studied in Activity 3 are interrelated. *Examples of questions:* – What is the influence of the climate on the hydrography of the Yangtze Kiang flood plain, particularly with respect to flooding? – What is the role of the Yangtze Kiang's floods on the fertility of this flood plain?
Population	The Yangtze Kiang flood plain has a population of some 70 million, and 95% of this population are farmers. The emphasis will be on the way of life of this essentially agricultural population.	5. Using a variety of visual aids: – Observe the density of population in urban and rural areas. – Identify the characteristics of the typical inhabitant of this region. 6. Using pertinent material, study the social organization of the rural population: *The commune* – Community organization (schools, hospital, day-care centers, housing, tools and equipment, cultural center, etc.); – Size of the commune; – Number of inhabitants and density; – Economic activities (crops, yield, use of the crops, etc.).
Physical environment	The way of life of Chinese farmers is influenced by the physical environment.	7. Using a variety of pictures identify the physical environment in this particular region of China: – landscape of rice fields; – division of the land into small holdings; – housing (shape, materials); – village (concentration, development); – means of transportation. 8. Using a map, identify the different crops grown on the Yangtze Kiang flood plain.

Content	Details on the Content	Suggested Teaching/Learning Activities
Agricultural activities	In the rich alluvial soil of a flood plain a variety of crops can be grown. Such is the case in this part of China. Having described the diverse crops produced in this flood pl: , the teacher should stress the cultivation of rice and its importance in the Chinese diet.	9. Using a number of pictures of a film, explain the operations involved in rice farming: – Preparation of the rice field (ploughing, harrowing, improvement of the soil, etc.); – Planting of seeds in nursery beds and replanting of seedlings; – Irrigation (method, works); – Harvest (cutting, threshing, etc.); – Crop yield (more than one harvest or crop, yield per hectare); – Importance in the diet of the Chinese.
Fishing	Besides rice growing, fishing is another activity engaged in by the Chinese farmer, an activity made particularly productive thanks to the many irrigation canals in the rice fields. Fish is an important part of the farmers' diet as it constitutes an excellent source of protein.	10. Explain that fishing is a complementary activity to rice growing. 11. Using a number of relevant documents, investigate Chinese habits and customs.
Habits, customs	It would be worthwhile to identify a number of Chinese customs and habits and to find out how they affect the people's way of life.	12. Ask a Chinese person some questions concerning the habits and customs, and mentality of his/her people.

Content	Details on the Content	Suggested Teaching/Learning Activities
	3. Hot Equatorial Environment – Suggested Case Study: The Tuaregs of the Sahara	
Location Surface area	The first step should be to locate, on a map of the world, the continent of Africa, and, on a map of Africa, the Sahara region and the Haggar massif where the Tuaregs are concentrated. The next step should be to observe the expanse of the Sahara region.	1. Use a map of the world to: – locate the continent of Africa; – identify the countries with territory in the Sahara; – locate the seas and oceans that wash the shores of the African continent. 2. Use a map of Africa to: – locate the Sahara; – identify some countries with territory in the Sahara; – locate the habit of the Tuaregs (the Haggar massif); – indicate the mean latitude of the Sahara; – compare Québec and the Sahara in terms of their size.
Climate Relief Hydrography	While climate, vegetation, relief, and hydrography can be studied separately, it is important to stress the links between these different elements. Such an approach should make it easier later for the pupil to understand how the human and physical environments of the region are interrelated.	3. Using appropriate visual aids, – Describe the climate of the Sahara: – winds (sirocco, khamsin), – precipitation, – temperature ranges. – Describe the natural vegetation of the Sahara: – aridity, – steppe, – ossis (date palms, fruit-bearing trees, vegetables). – Describe the relief of the Sahara: – sand desert (regs, ergs, dunes, hamadas). – Describe the hydrography of the desert: – the Nile River – wadis – salt lakes (shotts). – Show how these different elements are interrelated. Examples: – wind and dunes relief – aridity and wadis, etc.

Content	Details on the Content	Suggested Teaching/Learning Activities
Population Habitat	The Sahara desert is characterized by a low population density, and the fact that this population is structured into tribes or peoples. The human type represented by the Tuaregs should be studied in some detail.	4. Based on appropriate documentation on the Tuaregs: – Describe the customs of this nomadic people. – Describe their living conditions: – scarcity of water – sand storms – impact of modern life. – Describe the type of dwelling: – tents – encampment – oasis village – materials used. – Draw a plan or construct a model of a Tuareg encampment.
	The economic activities of the Tuaregs are particulary adapted to their way of life. Such activities as cattle raising, barter, and transportation of products are quite consistent with their nomadic way of life.	5. Based on a written description or on a film: – Identify the economic activities of the Tuaregs: – nomadic cattle raising (goats and camels) – irrigation agriculture in the oasis – trade, barter, and transportation of products. 6. *Questions:* – The Tuaregs practice a lot of bartering. What products do they exchange? – Why is the salt found in the shotts so valuable to the Tuaregs and other North African peoples? – Is the Tuaregs' clothing adapted to the climate?
Problems and perspectives	In their everyday life the Tuaregs have to deal with a variety of problems related to their environment. Among these problems, the following should be noted: – scarcity of water, – sand storms, – impact of modern life, – loss of certain traditions.	7. Identify a number of problems which the Tuaregs have to deal with. 8. Identify some future developments that may have an impact on the Tuaregs' way of life: – New irrigation techniques – Exploitation of oil – Exploitation of other minerals.

UNIT 5.3	**Terminal Objective: 5.3 To establish the relationships between the physical and human aspects of an environment.**	
	Intermediate Objectives: 5.3.2 To show how Man has adapted to a temperate mid-latitude environment.	
Content	**Details on the content**	**Suggested Teaching/Learning Activities**
	4. Temperature mid-latitude environments – Suggested Case Study: The Argentinian Pampa.	
Location	The first step should be to have the pupil locate the particular region under study. He should first locate Argentina in the world and then determine the location of the pampa region in Argentina.	1. Using a map of the world: – locate the Americas; – locate the seas and oceans that wash the shores of the Americas; – locate the following countries: Canada, United States, Mexico, Argentina, Brazil; 2. Using a map of South America: – locate Argentina; – locate the pampa region; – identify the countries that border the pampa; – trace the Parana and Rio Colorado rivers; – locate Buenos Aires and Bahia Blanca; – indicate the pampa's mean latitude.
Climate Vegetation Hydrography	In studying the physical environment of the pampa it is recommended that the climate, vegetation, soils, relief, and hydrography of the region be the focus. Those elements which are most characteristic of the region should be emphasized. The next step is to show the links between the physical environment and the way of life of the population.	3. Using an appropriate documentation: – observe the reversal of the seasons in the Southern Hemisphere in contrast with the Northern Hemisphere; – observe the effect of the Cordilleras on the pampa's climate. 4. Observe temperatures and precipitation in the Pampa region. 5. Compare the climate of the Pampa to that of the Canadian Prairies. 6. Using a variety of pictures: – describe the grass of the Pampa; – describe the humus resulting from the annual decay of the grass.
Soils Relief		7. Give the average elevation of the plain and compare it with the average elevation of the Canadian lowlands.

Content	Details on the Content	Suggested Teaching/Learning Activities
Population	In terms of social structure, the population of the Pampa is divided into two major groups: – the landowners, – the gauchos and other workers. There are two types of farming estates in the Pampa: – haciendas, – estancias.	8. Using a variety of pertinent documents: – Observe the population density of the Pampa: – rural population, – urban population. – Compare the population density of the Pampa with that of the Canadian Prairies. – Identify the ethnic composition of the Pampa's population. – Describe the types of farming or ranching estates found in the Pampa. – Investigate the following topics: – The gaucho's life in the Pampa – The life of a Pampa landowner – A Pampa farming or ranching estate and its adaptation to the physical environment – Division of the land in the Pampa.
Economic activities	To describe the main economic activities of the Pampa's population or the way of life in the region, it will be helpful to draw certain topical comparisons between the Pampa and the Canadian Prairies.	9. Using a variety of pertinent documents: – Identify the economic activities of the Pampa: – extensive cattle raising – extensive wheat growing – role of the railroads in the transportation of the products of the Pampa – role of the Rio Parana in the Pampa. – Compare these activities with those of the Canadian Prairies.
Problems	The pupil should also be made aware of the economic, social, and climatic problems which affect the Pampa's human environment.	10. Using a variety of documents (magazines, newspapers), identify and describe some problems encountered in the Argentinian Pampa: – dependence on international markets – overproduction – land distribution – droughts. 11. Identify some products imported from Argentina.

Content	Details on the Content	Suggested Teaching/Learning Activities
	5. Mid-latitude Temperate Environments – Suggested Case Study: The City of Vancouver	
Location of the city of Vancouver	The first step should be to have the pupil locate the Vancouver region and identify some of its physical features (mountains, river, ocean). It will also be useful to know certain things such as the names of the provinces and the borders of the region.	1. Using a map of the world: – Locate Canada; – Identify the different oceans bordering Canada (the Pacific, the Arctic, and the Atlantic Oceans); – Locate the United States and Alaska. 2. Using a map of Canada: – Identify the provinces and territories of Canada; – Trace the boundaries of British Columbia; – Locate the city of Vancouver; – Indicate the latitude of the city of Vancouver; – Shade in the Rocky Mountains; – Locate the Fraser River; – Identify Vancouver Island, the American border, and the Pacific Ocean.
Climate	While the climate, vegetation, relief and hydrography of the region can be studied separately, it is necessary to encourage the pupil to consider how these different elements are interrelated.	3. Using a variety of pertinent documents: – Examine a climate graph of Vancouver; – Observe the type of rainfall; – Identify a number of factors which influence the climate: – ocean currents – westerlies – mountain barrier of the Coast Mountains.
Vegetation Relief Hydrography	In examining these different aspects of the physical environment, it is not necessary to go into too many complex details. It is sufficient that the pupil acquire a broad understanding of different ways in which the physical and human environments are interrelated.	4. Using a variety of pictures: – Observe the enormous size and variety of the trees; – Make the connection between the climate and the length of the growing season. 5. Using a topographic map of the Vancouver region, observe: – the Fraser River: profile, direction, delta; – the elevation of the Fraser River delta region; – the areas with altitude between 600 and 1500 meters; – the presence of fjords and moraines (Burrard Inlet and the Burrard peninsula).

Content	Details on the Content	Suggested Teaching/Learning Activities
Population	This unit focuses on two points: the population of the city and the economic activities of the region. The cosmopolitan character of Vancouver should be emphasized.	6. Based on a set of statistics about Vancouver: – Give the number of inhabitants and the density of the population; – Observe the cosmopolitan character of the population; – Compare the proportion of non-English speaking people to that of the English speaking population.
Economic activities	Due to their complexity and variety, the economic activities of a big city cannot easily be identified. It is pertinent, however, to focus on the port of Vancouver and the economic activity it generates. This port is important because of several factors: – location and modern equipment, – large volume and great value of the merchandise handled there, etc.	7. Using a variety of pertinent documents, describe the activities carried out at the port of Vancouver, and identify some of the goods that pass through this port. 8. Using a land-use map of Vancouver: – Identify the commercial and industrial activities; – Identify the areas of the city reserved for industry and trade, explain their location.
Urban problems	Like many other major urban centers, Vancouver faces a variety of problems. These are some of the most crucial problems: – lack of adequate space for expansion, – urban takeover of agricultural areas, – high cost of building lots and housing, – heavy traffic on bridges leading to the central business district.	9. Identify the urban problems shared by all big cities. 10. Compare the problems encountered in Vancouver with those encountered in your city. 11. Discuss the following question: – In a modern and technological society such as Vancouver, do people adapt to their physical environment or do they modify their physical environment to meet their needs? – Is the situation the same in other less developed regions?

UNIT 5.3	**Terminal Objective: 5.3 To establish the relationships between the physical and human aspects of an environment.**	
	Intermediate Objectives: 5.3.3 To show how Man has adapted to a cold polar environment.	
Content	**Details on the Content**	**Suggested Teaching/Learning Activities**
	6. Cold Polar Environments – Suggested Case Study: Inuit Life	
Location of the Inuit's habitat	The first step should be to locate the habitat of the peoples of the Northern regions of the world, and then to locate the living environment of the Inuit of Canada.	1. Using a map of the world: – Locate the territories of the different peoples of the northern regions of the world: – Northern Canada – Northern Alaska – Northern Europe and USSR – Greenland 2. Using a map of Canada: – Locate the habitat of the Inuit: – Mackenzie delta – Coastal regions of the Northwest Territoiries – Arctic islands – Shores of Hudson Bay and Ungava Bay – Labrador – Observe the mean latitude of the regions identified.
Climate Vegetation Relief	A film about the Inuit should enable the pupil to have an overall view of their way of life as well as their physical environment.	3. Show the movie *Le souffle du Nord*, Direction générale des moyens d'enseignement, M.E.Q., 1981. 4. Using the movie as a reference, answer a number of questions about: – the climate – the natural vegetation – the relief – the isolation of the region
Population	Next, the pupil should be given more details about the origin of the Inuit, their number in Canada, and their adaptation to the physical environment.	5. Using the movie as a reference, discuss the following topics: – the Inuit human type – their customs and habits – their dwellings (traditional and modern) – their economic activities:
Economic activities	Contact with white people has triggered many changes in the Inuit's	

Content	Details on the Content	Suggested Teaching/Learning Activities
	way of life, and consequently in their economic activities.	in the past: hunting and fishing; today: – arts and crafts – commercial and recreational fishing – mining and exploitation of oil – public services – cooperatives
Problems	The Innuit's efforts to adapt to the white people's way of life have caused many problems in terms of their physical, social, and economic organization. These problems indicate the complexity of the shock between two cultures, and it is necessary to examine the many aspects of this particular bicultural encounter.	6. List the different problems raised by the modernization of the Innuit's living environment: – disappearance of some old customs and changes in their traditional housing – loss of territories and land claims; – etc. 7. Investigate the old hunting and fishing techniques used by the Innuit. 8. Compare these old techniques with those in use today. 9. Invite an Innuit to your class to ask him/her some questions about the customs and habits of the Innuit. 10. Organize an exchange of letters between your class and a class of Innuit pupils. 11. Build an igloo with modelling paste or other materials. 12. Draw a plan or construct a model of a modern Innuit village. 13. Investigate the Thule culture.
Summary of the characteristics of the different environments	After studying the three environments, the pupil should be able to compare them, to identify the differences and similarities between a hot, a temperate, and a cold environment.	1. Prepare a summary table of the three environments studied. (See the table on the next page). 2. On a map of the world, locate the three regions studied and indicate their respective latitudes. 3. Compare the climate graphs of the three environments. 4. Questions: – Do places at the same latitude have similar climates? – Do places at the same latitude have a similar natural vegetation?

TABLE: SUMMARY AND COMPARISON

	Hot Environment	Temperate Environment	Cold Environment
People			Innuit
Geographic location			Northern Canada, Alaska, USSR, Greenland
(Natural Environment) Climate: Vegetation: Hydrography: Soils: Relief:			Low temperatures (summer maximum: 0°C) tundra shores frozen year round permafrost jagged coastlines
Type of dwellings			Wood house, spare furniture, oil heating, electric stove, igloo, tent (hunters, fishermen)
Natural resources			Game, fish, minerals, oil
Economic activities			Commercial fishing, sale of art objects, handicraft, exploitation of oil, government service
Customs and habits			Thule culture, language, physical type

4. Evaluation

4. EVALUATION

4.1 Types of Evaluation

Educational evaluation is by no means a new activity: all teaching involves evaluation. During the period when the introduction of comprehensive schools and a wider range of programs made the proper placement of pupils imperative, educational evaluation was primarily designed to serve administrative purposes. In this context it was important to inform the pupil and the different people involved in education of the pupil's attainments and orientation to help him make choices for the future. While this type of evaluation is still necessary, the changes in education presented in *The Schools of Québec* make it possible to meet another set of needs that are more closely related to the teaching/learning process.

Evaluation means determining the degree to which course objectives have been achieved, interpreting the results, and making a value judgement about the pupils' learning.

The following table summarizes the two main types of evaluation currently used in teaching.

To apply the types of evaluation in this table, the teacher needs to understand the two different ways in which the evaluation results may be interpreted.

The teacher may check his pupils' progress by comparing their achievements with those anticipated at the beginning of the learning period. By measuring these achievements against a set level of performance, the teacher can find out whether the pupil has achieved the target objectives. This process is called criterion-referenced interpretation and is used in both formative and summative evaluation.

The teacher may relate a pupil's performance to that of the other pupils in the class, or in the school, by comparing their results. This will enable him to rank, place, and group pupils and is known as norm-referenced interpretation. It is used primarily in summative evaluation.

Educational evaluation is not an end in itself. When carried out properly, it enables those concerned to make the most pertinent and effective decisions with regard to pupil learning.

4.2 Evaluation for Educational Purposes

In teaching by objectives, evaluation can be used as a means of reinforcing or modifying the teaching/learning process. The General Geography Curriculum Guide explains how this may be done by outlining certain principles of evaluation and showing the connection between teaching/learning activities and ways in which they can be evaluated.

The following diagram presents a summary of the main aspects of educational evaluation.

The success of the teaching/learning process depends above all on the quality of teacher-pupil interaction. Thus, a learning difficulty is often the sign of a lack of communication between teacher and pupil. As a professional, the teacher should pay particular attention to the quality of this relationship and should make a point of regularly checking his pupils' progress in relation to the different learning objectives. For each of the educational activities designed to enable pupils to achieve a specific objective or part of the course, the teacher should find ways to make a critical assessment of the different steps in the teaching/learning process. This will enable him to decide whether he should change his strategies in the light of any difficulties his pupils may be having.

As a general rule, evaluation should be carried out in two distinct steps. In the first step, the teacher should detect the pupils who are having difficulty and identify those who are making progress as well as the type of difficulty or progress. There are many possible reasons for difficulties; often they are related to the degree of mastery of prerequisites, pupils' attitudes and motivation, teaching methods, level of difficulty of the objective, or the method of evaluation. In the second step, the insights gained in the first step enable the teacher to find out whether individual pupils or the whole class are succeeding or failing and to adjust different aspects of his teaching in order to remedy the problems and to capitalize on the positive elements.

The teacher thus gathers data on the pupils' strengths or weaknesses, for both are normally to be found in the average class. He can then build on the strengths to overcome the weaknesses.

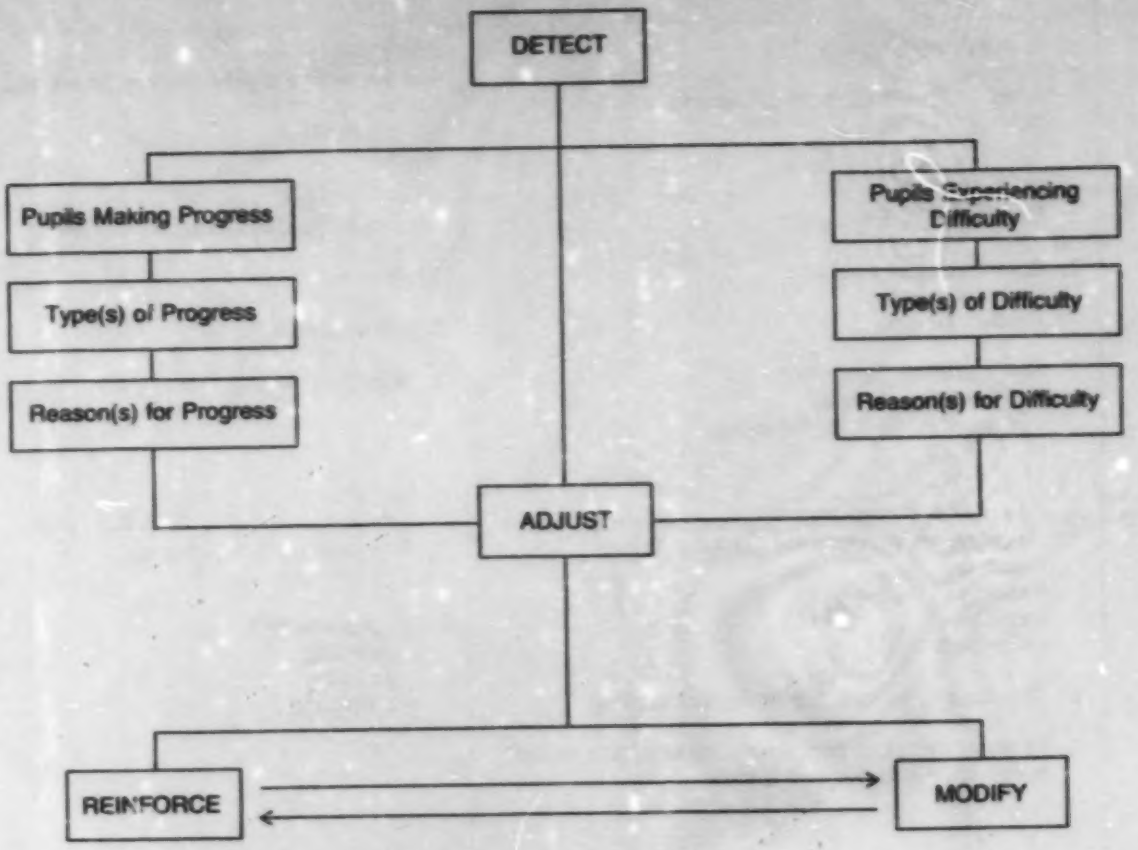
TABLE I: TYPES OF EVALUATION

	Formative Evaluation (Diagnostic)	Summative Evaluation (Balance Sheet)
Ultimate Goal Why	To modify / To reinforce > the teaching/learning in progress	To recognize degree of mastery: – of a set of course objectives – of a course
Immediate Goals	1. To determine: – the degree of mastery of a learning objective – the areas of learning that have not been mastered – the reasons for non-mastery. 2. To check pupils' progress and identify those having difficulty 3. To inform: – first, • the teacher • the pupil – as needed, • the parents • other people involved in education	1. To assign marks or to classify pupils. 2. To inform: – pupils – the teacher • about individual performance • about class or group performance 3. To report to: – parents – administrators – other school personnel
What to Evaluate	Each objective or group of objectives leading to the achievement of one or more of the terminal objectives of the course. (Specific knowledge, intellectual or technical skills)	A set of course objectives (Overall knowledge and intellectual or technical skills acquired)
How to Evaluate	1. Throughout the teaching/learning activity – by means of a specific evaluation activity	1. Using a specific evaluation instrument that ensures: – a representative selection of objectives – the validity of the instrument

	Formative Evaluation (Diagnostic)	Summative Evaluation (Balance Sheet)
	2. With a view to informing pupils about: – the course objectives – the learning sequence – the elements to be mastered – the achievement criteria or requirements	2. With a view to informing pupils about: – the course objectives – the learning sequence – the elements to be mastered – the achievement criteria or requirements
When to Evaluate	Frequently and regularly: – before – during – after > the teaching/learning activity	End of unit or term: – at the end of a set of course objectives – at the end of a course
Who Should Evaluate	1. Main responsibility: 2. Participation of pupils – co-evaluation – self-evaluation 3. Administrative personnel: – of the school board – of the ministère de l'Éducation	Shared responsibility (decision making) 1. Teacher 2. School board 3. M.E.Q.
Decisions Made on the Basis of the Evaluation	1. To continue or modify the teaching: – planning – choice of strategies – attitudes – materials 2. To set tasks to reinforce or correct learning. 3. To make decisions concerning the purchase or the making of instructional materials.	1. To – promote (unit/course) – certify 2. To proceed with: – selecting – grouping – classifying

DIAGRAM I

EDUCATIONAL EVALUATION



This concept of educational evaluation applies equally well to both summative and formative evaluation. However, as can be seen from the information in *Table 1 — Types of Evaluation*, summative evaluation with norm-referenced interpretation is used mostly for administrative purposes, whereas formative evaluation is used solely for instructional purposes.

4.3 Steps in the Process

4.3.1 Summative Evaluation

Summative evaluation is used to determine the attainment of a set of course objectives. Unlike formative evaluation for instructional purposes outlined in Diagram 1, it does not provide the information that allows the teacher to identify specific problem areas and work out ways to remedy them. While this type of evaluation is essential for checking pupils' progress, the Curriculum Guide, in keeping with the recommendations made in the course, advocates the use of formative evaluation as a more appropriate means of achieving the instructional aims of evaluation.

4.3.2 Formative Evaluation

For this type of evaluation, the teacher begins by determining his own course objectives. He should base these on the objectives of the General Geography course and the suggestions made in the Curriculum Guide and tailor them to his pupils' abilities and the available instructional materials.

In the classroom these course objectives take the form of teaching/learning activities. The actual activity, or part of it, can be used to evaluate the cognitive and affective domains of learning. Evaluation can also be carried out by means of a specific task, such as oral or written questions (objective or subjective), research projects, observation, interviews, etc. The type of method selected determines the point at which the evaluation should be effected, either before (pre-test), during, or after the learning activity.

The teacher should choose the tools he will use for collecting data to suit both the situation and the means of evaluation selected: marking guide or correction key, analysis and observation chart, rating scale, checklist, etc.

If he chooses to evaluate pupils during the learning activity, he should keep in mind the achievement criteria set for that particular activity. These criteria could include the schedule, method of presentation, reference points, and type of participation anticipated.

5. Selected Bibliography

5. BIBLIOGRAPHY

Introduction

This bibliography is incomplete for two reasons. First, no summary of the works listed has been provided, and consequently there is no indication of their content. Second, it would have been necessary to read, listen to, or watch the different materials in order to assess their relevance to the program or to find out whether they are up to date.

The different works listed in the bibliography have been selected on the basis of the following criteria:

1. Availability to teachers

An effort was made to collect titles of works that are easily available on the market, in libraries, or in appropriate resource centers. With a few exceptions, narrowly specialized works or works intended only for researchers have not been included.

2. Publishing date of the works

Except for a number of works considered classic and still easily available on the market, the works that are listed were published after 1960. These works seem to be more appropriate for the new instructional methods in geography.

3. Adaptation to the program

Some title have been selected because the works are considered particularly suitable for the attainment of the objectives of the program. Some of these choices may be questionable. However, based on their experience and knowledge, teachers should be able to adjust the bibliography to suit their particular needs.

Instructional Materials and References

For easier reference, this section has been divided into two parts: "Printed Materials" and "Audiovisual Materials."

The works listed in the "Printed Materials" section fall into the following categories: atlases, textbooks, workbooks, and reference works. The audiovisual materials include: 16 mm films, slides and film strips, and transparencies.

For each title given, the corresponding module is indicated. A list of distributors of these types of materials is included at the end of the audiovisual materials section.

The lists of audiovisual and printed materials given here are not exhaustive, nor is any judgment made with respect to their educational value. These materials which have been found to be helpful by those who have used them are being suggested to help teachers find and select the materials they need to do their job.

5.1 Printed Materials

Remarks

Many of the works listed are suitable for pupils. Most, however, are basically for teachers. While the works listed here are as varied as possible, some will be found to be similar. It is up to the teacher to choose those he considers suitable.

It should be noted that the list of instructional materials approved by the Ministère is updated every year.[1]

The entries are in alphabetical order. For practical purposes the columns on the right indicate the particular modules to which each work corresponds.

1. *Matériel didactique autorisé par le ministère de l'Éducation, pour le secondaire générale et professionnel*, Direction du matériel didactique, Direction générale du développement pédagogique.

5.1 Printed Materials

A – Atlas
T – Text
W – Workbook
R – Reference

		MODULES				
		1	2	3	4	5
T	Addison, W. **People and Pollution,** Gage 1977					X
R	Bunnett, R. **Physical Geography in Diagrams,** Longman 1976 (Academic Press	X				
R	Clare, R. **Earthquakes, Volcanoes and Mountains,** MacDonald, 1971				X	
T	Clare, R. **World Towns and Cities,** MacDonald, 1974					X
T	Clare, R. **Rocks and the Landscape,** MacDonald, 1972				X	
T	Clare, R. **Planet Earth,** MacDonald, 1972 (GLC Publishers)	X				
T	Crisp, I. **Earthquakes, Mountains and Volcanoes, Rocks, Rivers, Glaciers,** Nelson, 1979				X	
T	Derry, W. **Geolab 1, Geolab 2,** McGraw-Hill Ryerson, 1981			X		
R	Disley, J. **Your Way with Map and Compass,** Canadian Orienteering Service 1973			X		
T	Donaldson, R. **A Canadian's Urban Environment,** Butterworths, 1975					X
T	Ewers, R. **A Universe to Explore,** Holt, Rinehart, Winston, 1976	X				
T	Graham, H. **Reading Topographic Maps,** Holt, Rinehart, Winston, 1968			X		
T	Grime, A. **Introducing Topographic Maps, Topographic Map Symbols, Grid References, Contour Lines,** Longview House, 1977			X		
T	Grime, A. **Latitude and Longitude,** Longview House, 1977		X			
R	Hardwick, F. **Understanding Maps,** Clarke, Irwin, 1961			X		

		MODULES				
		1	2	3	4	5
T	Harrison, P. **What's Urban Geography,** Gage, 1976					X
R	Inch, R. **The Physical Environment,** McGraw-Hill Ryerson, 1972				X	
R	Janes, R. **Earth Science,** Holt, Rinehart, Winston, 1974				X	
T	Job, K. **Skills for Understanding Maps and Globes,** Follett, 1976		X			
A	Kemball, Walter G. **Canadian Oxford Intermediate Atlas,** Oxford, 1985, Toronto		X			
R	Kemball, W. **Canada and the World,** Oxford, 1980		X			
T	Lehr, P. **Weather,** Golden Press, 1975				X	
T	Marchington, T. **Reading Maps,** Macdonald, 1975			X		
T	Marchington, T. **Earth's People,** Macdonald, 1973					X
T	Marchington, T. **Natural Disasters,** Macdonald, 1974				X	
T	Marchington, T. **Competition for Land,** Macdonald, 1975					X
T	Marchington, T. **Tropical Lands,** Macdonald, 1977					X
T	Marchington, T. **Conserving the Earth's Resources,** Macdonald, 1974				X	
T	Marchington, T. **Cold and Temperate Lands,** Macdonald, 1977					X
T	Morris, W. **Water,** EMR Canada, 1969				X	
R	**The Solar System,** Chart issued by National Geographic Society, July, 1961	X				
A	Nelson and Sons — **Nelson World Atlas,** Nelson, 1974		X			
T	Oxenhorn, J. **Earth Science,** Globe, 1977				X	
R	Price, B. **Water, Ice and Wind,** Macdonald, 1973				X	

		MODULES				
		1	2	3	4	5
R	Price, B. **The Weather**, Macdonald, 1972				X	
R	Reddin, I. **Town Studies**, Macdonald, 1977					X
R	Smyth, J. **Elements of Geography**, Macmillan, 1976				X	
T	Wentworth, D. **Mapping Small Places**, Holt, Rinehart, Winston, 1972			X		
T	Wilson, T. **Settlement**, Blackwell, 1973					X
T	Winter, E. **Urban Landscapes**, Bellhaven, 1971					X

5.2 Audiovisual Materials

Remarks

The following pages contain a list of audiovisual instructional materials appropriate for the general geography course. These materials are presented in alphabetical order and according to the types of media. The modules and units for which these materials are particularly suited are clearly indicated. Teachers should be able, therefore, to identify the materials they consider the most suitable for each module, based on their particular needs and on the equipment available.

5.2.1 16 mm Films

5.2.2 Slides and Film Strips

5.2.3 Transparencies

5.2.4 How to Use the Audiovisual Materials

5.2.5 List of Major Distributors

5.2.1	16MM FILMS			MODULE				
Title	Producer	Distributor	Notes	I	II	III	IV	V
A CITY IS	NFB	NFB	C 17.59					5.2.2
THE AGING OF LAKES	Britannica	Bouchard	C 17 m.				4.4.3 4.2.2	
AIRCRAFT IN FOREST FIRE CONTROL	NFB	NFB	C 27 m.				4.3	
THE ALPS (untamed world)	CTV	Bouchard	C 25 m.		2.2.1		4.1	
THE ANNANACKS (Inuits)	ONF	ONF	C 29 m.					5.3.3
THE ARCTIC AND MAN (untamed world)	CTV	Bouchard	C 25 m.	1.1.1				5.3.3
ASIA	CTV	Bouchard	C 25 m.	1.1.1	2.2.1 2.2.2			
AUTUMN	Moreland Latchford	Télé-Film	C 6 m.	1.3.2			4.3	
THE ATMOSPHERE IN MOTION	Britannica 1978	Bouchard	C 20 m.				4.3.1	
AXIS MAKES CLIMATE	Moreland Latchford	Télé-Film	C 7 m.	1.2.2			4.3	
BRITISH AMERICA (untamed world)	C.T.V.	Bouchard	C 25 m.					5.3.2
CANADA: LANDFORM REGIONS	NFB	NFB	C 15.8 m.				4.1 4.2	
CASTLEGUARD CAVE	NFB 1974	NFB	C 50.40 m.				4.2.2	
CAUSES OF THE SEASONS	Coronet		C 10 m.	1.3.2				
CHINA, AN END TO ISOLATION	F.F.		C 23 m.					5.3.2
THE CLIMATES OF NORTH AMERICA	NFB 1962	NFB	C 16.13 m.				4.3.1 4.3.2	
CONTINENTAL DRIFT	NFB 1968	NFB	C 9 m.				4.1	

5.2.1	16MM FILMS			MODULE				
Title	Producer	Distributor	Notes	I	II	III	IV	V
THE CONTINUING PAST	NFB	NFB	C 16 m.				4.1	
CORDILLERAS (untamed world)	CTV	Bouchard	C 25 m.		2.2.1		4.1	
DAY IN AFRICA (untamed world)	CTV	Bouchard	C 25 m.	1.1.1				5.1 5.3.1
DESERTS (untamed world)	CTV	Bouchard	C 25 m.					5.3.1
EARTHQUAKES: LESSON OF A DISASTER	Britannica	Bouchard	C 13 m.				4.1.2	
EARTHQUAKES AND VOLCANOES	BFA		C 14 m.				4.1.2	
ELEMENT 3 (Water in the World)	NFB	NFB	C 46 m.	1.1.1			4.4	5.3
EMERGENCY COMPASSES	Moreland Latchford	Télé-Film	C 12 m.			3.1.1		
EROSION AND WEATHERING	Britannica 1978	Bouchard	C 22 m.				4.2.2	
EROSION: LEVELLING THE LAND	EB		C 14 m.				4.2	
EVERY SQUARE INCH	NFB	NFB	C 23.25 m.			3.2 3.3		
EVIDENCE FOR THE ICE AGE	EB		C 19 m.				4.2.2	
EVOLUTION OF THE APPALACHIANS	NFB	NFB	C 3.18 m.				4.1.2 4.2.2	
EXPLORING THE MOON	Moreland Latchford	Télé-Film	C 7 m.	1.2.2				
FACE OF THE EARTH	NFB	NFB	C 17.2 m.				4.1 4.2	
FLAT AND ROUND	Moreland Latchford	Télé-Film	C 6 m.	1.3.2			4.3	
FOREST REGIONS OF CANADA	NFB	NFB	C 17.13 m.				4.3.3	

5.2.1	16MM FILMS			MODULE				
Title	Producer	Distributor	Notes	I	II	III	IV	V
GLACIATION	NFB	NFB	C 11.2 m.				4.2.2	
GLACIER ON THE MOVE	Britannica	Bouchard	C 11 m.				4.2.2	
GLIMPSES OF CHINA	NFB 1974	NFB	C 69 m.					5.3.1
HEARTBEAT OF A VOLCANO	Britannica 1978	Bouchard	C 21 m.				4.1.2	
HEAT AND HEMISPHERES	Moreland Latchford	Télé-Film	7 m.	1.3.2	2.1.1			
HOW TO BUILD AN IGLOO	NFB 195C	NFB	C 10.25 m.					5.3.3
HUNGER	NFB	NFB	C 11.22 m.					5.1.1
IF YOU COULD SEE THE EARTH	EB		C 10 m.	1.3.1				
THE IMPOSSIBLE MAP	NFB	NFB	C 10.17 m.			3.2 3.3		
IN ALL SEASONS	NFB	NFB	C 23.33 m.				4.3	
INDUSTRIAL REGION IN SWEDEN	VEC		C 18 m.					5.3.4
INVISIBLE FORCE OF DIRECTION	Crawley		C 21 m.			3.1.1		
JAPAN (untamed world)	CTV	Bouchard	C 25 m.	1.1.1	2.2.2			5.2
THE JUNGLE (untamed world)	CTV	Bouchard	C 25 m.	1.1.1			4.3	5.3
LATITUDE, LONGITUDE AND TIME ZONES	Coronet		C 14 m.		2.1			
LIFE IN NORTHERN LANDS	Coronet		C 11 m.					5.3.4
LIGHT AND SHADOW	Moreland Latchford	Télé-Film	C	1.3.1				
MAN AND HIS ENVIRONMENT (untamed world) (series)	CTV	Bouchard	C 25 m.	1.1.1			4.2.2	5.3
MAO'S CHINA	CBC		C 29 m.					5.3.2

5.2.1	16MM FILMS			MODULE				
Title	Producer	Distributor	Notes	I	II	III	IV	V
MAP PROJECTIONS IN THE COMPUTER AGE	Coronet		C 11 m.		2.2.3			
MAP SKILLS: RECOGNIZING PHYSICAL FEATURES	Coronet		C 11 m.			3.4.2		
MAPS AND WEATHERVANES	Moreland Latchford	Télé-Film	C 6 m.		2.2	3.2		
MEN AND EARTH	NFB	NFB	C 21.23 m.				4.1 4.2	
MONUMENTS TO EROSION	Britannica 1978	Bouchard	C 11 m.				4.2.2	
MOVING PLATES AND CONTINENTS	Cinémédia 1974	NFB	C 2.43 m.				4.1	
MULTIPLE MAN	NFB 1969	NFB	C 15.40 m.					5.1.1
THE NOMADS OF AFRICA (untamed world)	CTV	Bouchard	C 25 m.	1.1.1				5.2.3 5.3.1
THE NORTH	Min. Aff. Ind. et du Nord	NFB	C 14 m.					5.3.3
NORTH BRAZIL	Sterling		C 17 m.					5.3.1
NORWEGIAN FJORDS	VEC		C 13 m.					5.3.4
OFFSHORE	NFB	NFB	C 19.46 m.				4.4.3	
ORIGINS OF WEATHER	NFB	NFB	C 12 m.				4.3.1	
THE ORIGIN OF WEATHER	NFB	NFB	C 12.17 m.				4.3.1	
OUR LAND: AUSTRALIA	Viking		C 12 m.					5.3.3
OUR LAND IS OUR LIFE	NFB	NFB	C 58 m.					5.3.3
OUR PLANET EARTH	Moreland	Télé-Film	C 8 m.	1.1 1.2				
PEOPLE OF AFRICA	CTV	Bouchard	C 25 m.	1.1.1				5.3.1 5.2.3

5.2.1	16MM FILMS			MODULE				
Title	**Producer**	**Distributor**	**Notes**	**I**	**II**	**III**	**IV**	**V**
POPULATION EXPLOSION	NFB	NFB	C 14.34 m.				4.1	5.1
THE POSITION OF THE MOON	Moreland Latchford	Télé-Film	C 8 m.	1.2.2				
RICHES OF THE EARTH	NFB 1955	NFB	C 16.20 m.				4.1.2 4.1.3	
ROCKS THAT FORM ON THE EARTH'S SURFACE	EB		C 16 m.				4.1.3	
ROCKS THAT ORIGINATE UNDERGROUND	EB		C 23 m.				4.1.3	
THE SAHARA (untamed world)	CTV	Bouchard	C 25 m.	1.1.1				5.1 5.3.1
SATELLITES OF THE SUN	NFB	NFB	C 16 m.	1.2.1		3.1.1 3.4		
THE SEA	NFB	NFB	C 28.36 m.				4.4	
SIZE AND DISTANCE	Moreland Latchford	Télé-Film	C 5 m.	1.2				
THE SIZE OF THE MOON	Moreland Latchford	Télé-Film	C 8 m.	1.2.2				
THE SOLAR SYSTEM	Britannica 1978	Bouchard	C 18 m.	1.2.1				
SOUTH AMERICA (untamed world)	CTV	Bouchard	C 25 m.	1.1.1	2.2.2			5.1 5.2
SOUTH BRAZIL	Sterling		C 17 m.					5.3.1
STARS — Part I	Moreland Latchford	Télé-Film	C 7 m.	1.2.1				
STARS — PART II	Moreland Latchford	Télé-Film	C 7 m.	1.2.1				
STORMS: THE RESTLESS ATMOSPHERE	Britannica 1978	Bouchard	C 22 m.				4.3.1	

5.2.1	16MM FILMS			MODULE				
Title	Producer	Distributor	Notes	I	II	III	IV	V
SUCCESSION: FROM SAND DUNE TO FOREST	Britannica 1978	Bouchard	C 13 m.				4.1.2	
THE SUN	Moreland Latchford	Télé-Film	C 8 m.	1.2.1				
TEMPLES OF TIME	NFB	NFB	C 26.45 m.	1.1.4 1.3.2			4.3 4.2.2 4.2.1	
TIME AND DIRECTION	Moreland Latchford	Télé-Film	C 7 m.	1.3		3.1		
TO MAKE A MAP	NFB	NFB	C 20.50 m.			3.2 3.4		
TO SENSE THE WONDER (Nat. Parks)	Crawley 1978	NFB	C 27.23 m.				4.1 4.2	
UNDERSTANDING OUR EARTH: ROCKS AND MINERALS	Coronet		C 12 m.				4.1.3	
UNDERSTANDING OUR EARTH: SOIL	Coronet		C 12 m.				4.1.3	
UNIVERSE	NFB	NFB	C 27.42 m.	1.2.1				
USING A COMPASS	Moreland Latchford	Télé-Film	C 11 m.			3.1.1		
VANCOUVER: PACIFIC GATEWAY TO CANADA	Moreland Latchford	Télé-Film	C 12 m.					5.3.3
VOLCANISM	NFB 1972	NFB	C 4.17 m.				4.1.2	
VOLCANOES: EXPLORING THE RESTLESS EARTH	EB		C 18 m.				4.1.2	
WATER: THE HAZARDOUS NECESSITY	NFB 1977	NFB	C 26.27 m.				4.2.3	
THE WAYS OF WATER	Britannica 1978	Bouchard	C 13 m.				4.2.2 4.3.1	

5.2.1	16MM FILMS							
Title	**Producer**	**Distributor**	**Notes**					
WHAT IS SPRING?	Moreland Latchford	Télé-Film	C 6 m.	1.3.2			4.3	
WHAT IS SUMMER?	Moreland Latchford	Télé-Film	C 6 m.	1.3.2			4.3	
WHAT IS WINTER?	Moreland Latchford	Télé-Film	C 6 m.	1.3.2			4.3	
WHAT MAKES CLOUDS?	Britannica 1979	Bouchard	C 19 m.				4.3.1	
WHAT MAKES RAIN?	Britannica 1978	Bouchard	C 22 m.				4.3.1	
WHY DO WE STILL HAVE MOUNTAINS?	EB		C 20 m.				4.1.2	
YESTERDAY — TODAY — THE NETSILIK ESQUIMO	NFB	NFB	C 57.31 m.					5.3.3 5.2.3

5.2.2 SLIDES AND FILMSTRIPS				MODULE				
Title	**Producer**	**Distributor**	**Notes**	**I**	**II**	**III**	**IV**	**V**
INTRODUCTION TO THE TOPOGRAPHICAL MAP	N.F.B.	McIntyre	FS			3.3 3.4.2		
GLACIERS	N.F.B.	McIntyre	FS				4.2.2	
GLACIAL LANDFORMS	N.F.B.	McIntyre	FS				4.2.2	
GLACIATION (20)	N.F.B.	McIntyre	S				4.2.2	
LEARNING ABOUT ROCKS AND MINERALS	N.F.B.	McIntyre	FS				4.1.3	
MONTREAL, QUEBEC (30)	N.F.B.	McIntyre	S					5.2.2
LEARNING ABOUT OUR UNIVERSE	Moreland Latchford	School Services	FS & CASS(6)	1.2				
LEARNING ABOUT SCIENCE	Moreland Latchford	School Services	FS & CASS(5)	1.2.2				
AIR AND AIR POLLUTION	Visual Productions	McIntyre	FS & CASS				4.2.2 4.4.3	5.2.2 5.2.3
THE SOLAR SYSTEM	National Geographic	National Geographic	FS & CASS(5)	1.2.1				
TRANSPORTATION AROUND THE WORLD	United Learning	Wintergreen	FS & CASS(2)					5.1.2
GEOGRAPHY OF EUROPE PART I NORTHERN EUROPE	National Geographic	National Geographic	FS & CASS					5.3.4
AUSTRALIA: THE ISLAND CONTINENT	McIntyre	McIntyre	FS & CASS(4)					5.3.3
NORTH AMERICA: AN URBAN STUDY CITY GROWTH	Visual Publication	McIntyre	FS & CASS					5.2.2
FOLD MOUNTAINS	Visual Publication	McIntyre	FS & CASS				4.1.4	
VOLCANOES	Visual Publications	McIntyre	FS & CASS				4.1.2	

5.2.2 SLIDES AND FILMSTRIPS				MODULE				
Title	**Producer**	**Distributor**	**Notes**	**I**	**II**	**III**	**IV**	**V**
THE SEA	Visual Publication	McIntyre	FS & CASS				4.4.1	
ROCKS AND MINERALS	Visual Publication	McIntyre	FS & CASS				4.1.3	
RIVERS	Visual Publication	McIntyre	FS & CASS				4.4.2	
ICE	Visual Publication	McIntyre	FS & CASS				4.2.3	
THE EARTH WITHOUT MAN — CLIMATE REGIONS EQUATORIAL — HOT GRASS-LANDS DESERTS — COLD LANDS MONSOON LANDS — MARITIME LANDS	Visual Publication	McIntyre	FS & CASS(9)				4.3	
GEOLOGY: OUR DYNAMIC EARTH: EARTH'S SURFACE — WEATHERING EROSION	National Geographic	National Geographic	FS & CASS(4)				4.4.1 4.2.2	
WEATHERING AND EROSION	National Geographicf	National Gecgraphic	FS & CASS				4.2.1 4.2.2	
ROCKS AND MINERALS	National Geographic	National Geographic	FS & CASS				4.1.3	
WHAT MAKES DAY, NIGHT AND THE SEASONS	National Geographic	National Geographic	FS & CASS	1.3.1 1.3.2				
AN INTRODUCTION TO THE AMAZING UNIVERSE	National Geographic	National Geographic	FS & CASS(2)	1.2.1				
THE PEOPLE'S REPUBLIC OF CHINA	National Geographic	National Geographic	FS & CASS(3)					5.1.1
CAREERS IN EARTH SCIENCES: REMOTE SENSING, THE GEOLOGIST, THE MAPMAKERS	N.F.M.B.	McIntyre	FS (3)			3.3	4.1.3	

5.2.2 SLIDES AND FILMSTRIPS				MODULE				
Title	**Producer**	**Distributor**	**Notes**	**I**	**II**	**III**	**IV**	**V**
LEARNING ABOUT ROCKS AND MINERALS	N.F.B.	McIntyre	FS				4.1.3	
MAP SKILLS SERIES: MAPS — SCALE — ORIENTATION	N.F.B.	McIntyre	FS (3)		2.1	3.1 3.2 3.3		
TOPOGRAPHIC MAPS FOR TEACHERS	N.F.B.	McIntyre	FS & CASS(1)			3.3		
THE EARTH'S CLIMATE	National Geographic	National Geographic	FS & CASS(3)				4.3	
THE ELEMENTS OF CLIMATE: SEASONS — WIND — RAIN — TIDES SUN — SEA — MINTS — OCEAN CURRENTS	Visual Publication	McIntyre	FS & CASS(9)				4.3	
WEATHERING	Visual Publication	McIntyre	FS & CASS				4.2.1	
SOILS	Visual Publication	McIntyre	FS & CASS				4.1.3	
EARTHQUAKES	Visual Publication	McIntyre	FS & CASS				4.1.2	
COASTAL LAND FORMS	N.F.B.	McIntyre	FS				4.1.4	
MOUNTAIN LAND FORMS	N.F.B.	McIntyre	FS				4.1.4	
FLUVIAL LANDFORMS	N.F.B.	McIntyre	FS				4.1.4	
DESERT LANDFORMS	N.F.B.	McIntyre	FS				4.1.4	
VOLCANIC LANDFORMS	N.F.B.	McIntyre	FS				4.1.4	
OUR PLANET EARTH CLIMATE POPULATION	United Learning	Wintergreen	FS & CASS(6)				4.3.2	5.1.1

5.2.5 TRANSPARENCIES				MODULE				
Title	Producer	Distributor	Notes	I	II	III	IV	V
ASTRONOMY 1 & 2 NIGHT & DAY, THE MOON, THE SEASONS, THE SOLAR SYSTEM, STARS, TIDES, GALAXIES	Hubbard	Ward's	21	1.2				
EROSION	Ward's	Ward's	15				4.2.2	
GEOLOGY VOLCANOES, MOUNTAINS, FAULTS, GLACIERS, HILLS, CROSSCUTS	Hubbard	Ward's	18				4.1	
GEOMORPHOLOGY HILLS, PLAINES, FAULTS, VOLCANOES	Ward's	Ward's	17				4.1	
MAP READING 1 & 2 PROJECTIONS, SYMBOLS, CONTOUR LINES, LATITUDE, LONGITUDE, SCALE	Hubbard	Ward's	12		2.1	3.3		
METEOROLOGY WATER CYCLE, FRONTS, CLOUDS, CLIMATS, TEMPERATURE, WEATHER, MAP	Hubbard	Ward's	9				4.3	
OCEANOGRAPHY 1 & 2 CURRENTS, EARTHQUAKES, SEA BOTTOM WAVES, SHORELINE, REEFS, ATOLLS	Hubbard	Ward's	22				4.4	

5.2.6 HOW TO USE THE AUDIOVISUAL MATERIALS

5.2.6.1 Different Ways of Using the Materials

- *Integration*

Many teachers argue that they do not have the time to use audiovisual materials and that their courses are already overloaded. Their position is understandable, since in many cases audiovisual materials only serve as illustration materials for lecture presentations. The right way to use audiovisual aids is to integrate them with the instructional materials, to make them an integral part of the course, completing them when necessary.

- *Technical Skills*

Many teachers have had embarassing experiences with audiovisual aids (broken films, erased tapes, bad connections, etc.) and have stopped using them for that reason. All they need, however, is proper training. In most school boards teachers can enlist the help of the resource personnel (subject consultants, technicians, etc.) or, failing that, they can consult a variety of books on the subject in the documentation centers.

- *Efficiency*

Teachers have to be efficient in using audiovisual materials as instructional materials, otherwise these materials could become simple fillers. They should *prepare* the pupils before presenting a particular document, indicating its content and the important points. They should make sure that the *presentation* is made in a favorable and active atmosphere. Finally, they should put the document to good use — summing up, drawing conclusions, asking the pupils to do certain tasks connected with the material.

5.2.6.2 Where to Find Documentation

The following list should help teachers find the audiovisual materials they need. But first, here are a number of sources from which audiovisual materials can usually be obtained:

Documentation Centers

Regional documentation centers contain many more resources than usually thought. A great variety of materials can be found in those centers and knowledgeable resource persons can be consulted.

Public Film Libraries

Branch offices of the D.G.C.A. (Office du Film du Québec), the N.F.B., Radio-Québec, and lending libraries.

Private Film Libraries

Several firms such as Hydro-Québec, Alcan, Esso, B.P., etc., offer a variety of films and other materials free of charge.

Consulates and Embassies

Materials can also be obtained from these institutions free of charge.

Specialized Firms

The names of the major firms are listed on the following pages.

Personal Resources

Teachers should not forget their own photographs, drawings, and transparencies, which they may have accumulated over the years. In addition, pictures from books, magazines, and newspapers, are readily available. Teachers can use them with an opaque projector or make slides with them, provided of course that copyright laws are not violated.

5.2.7 LIST OF MAJOR DISTRIBUTORS

(a) This list includes the names and addresses of major distributing companies. It should be noted that several of them also distribute the products of different production companies.

BOUCHARD:	Bouchard et Associés 5275, rue Berri Montréal H2J 2S7	European films American films (adapted)
D.G.C.A.:	Direction Générale du Cinéma et de l'Audio-Visuel 360 McGill Montréal H2Y 2E9 1601 Boul. Hamel ouest Québec G1N 3Y7	Films made by the Office du Film and others Lending film library Sales: Bouchard et Associés
KEUFFEL ESSER:	Keuffel et Esser du Canada 1375, Boul. Charest ouest Québec G1N 2E7	Transparency originals Graphic art materials
NYSTROM:	Nystrom Georges E. Brault 584 Victoria Sherbrooke J1H 3J5	Maps, transparencies, globes
N.F.B.:	National Film Board Montreal Regional Office 550, rue Sherbrooke ouest Montréal H3A 1B9	Film library (16 mm films) Sales: Films and videocassettes
	Québec Regional Office 2, Place Québec Boul. St-Cyrille ouest Québec G1R 2B5	See other regional offices
SÉCAS ADIMEC	Sécas-Adimec 5275, rue Berri Montréal H2J 2S7	Slide shows Slides Film strips Large number of producers
TÉLÉ FILM:	Les Entreprises Internationales Télé-Film ltée 407, Boul. St-Laurent Montréal H2Y 2Y5	16 mm films

WARD'S:	Ward's Arbor Scientific Co. Ltée Box 113, Port Credit Ontario L5G 4L6	Distributor for Hubbard and others Slides 8 mm films Film strips

(b) Other Important Distributors

BRAULT ET BOUTHILLIER LTÉE:	Brault et Bouthillier Ltée 700, rue Beaumont Montréal H3N 1V5	Instructional materials Maps, globes, etc.
CORONET:	Coronet Instructional Media Ltd 200, Steelcase Road East Markham Ontario L3R 1G2	10 mm films Film strips, etc.
CRAWLEY FILMS:	Crawley Films Limited 19, ave. Fairmont Ottawa Ontario K1Y 3B5	16 mm films
DENOYER:	Denoyer — Geppert 1450, rue Plessis, pièce 607 Montréal H2L 2X4	Instructional materials Maps, globes
FILM FRANÇAIS:	Le Film Français Château Maisonneuve, suite 558 4999 ouest, Ste-Catherine Montréal	16 mm European films Film loops
GAGE EDUCATIONAL:	Gage Educational Publishing P.O. Box 5000 164, Commander Blvd Agincourt Ontario M1S 3C7	Film strips Slides Transparencies
MCINTYRE EDUCATIONAL:	McIntyre Educational 30, rue Kelfield Rexdale Ontario	
NATIONAL GEOGRAPHIC:	National Geographic Educational Service 151, Carlingview Drive Unit 5 Rexdale Ontario M9W 5E7	Film strips with cassettes Excellent montages, easily adaptable

RADIO QUÉBEC	Office de Radio-télédiffusion du Québec 1000, rue Fullum Montréal H2K 3L7	Videocassettes Loans and sales
RAND MCNALLY:	Rand McNally Sonore Tour Inc. C.P. 129 Haute-ville Québec G1R 4P3	Instructional materials Maps, globes Small desktop globes
SERVICE DE CINÉMATHÈQUE MODERNE:	1055, Beaver Hall Hill Suite 200 "A" Montréal H2Z 1S5	Lending film library Major companies (oil companies and others)
SCHOOL SERVICES OF CANADA:	School Services of Canada 66, Portland St. Toronto Ontario M5V 2M8	Film strips with cassettes
SCOTT EDUCATION DIVISION:	Scott Education Division 99, Advance Rd Toronto Ontario M8Z 2T3	Film strips with cassettes Transparencies
TIME LIFE:	Time Life 55, Six Point Road Toronto Ontario M8Z 2X3	Film strips
VISUAL EDUCATION CENTRE:	Visual Education Centre 75, ave. Horner, unité 1 Toronto Ontario M8Z 4X5	Film strips Slides Transparencies
WESTMINSTER FILMS:	Westminster Films Limited 259 est, rue Gerrard Toronto Ontario M5A 2G1	16 mm films

6. Appendix 1

TOPOGRAPHIC MAP OF BELOEIL: USER'S GUIDE

31H 11-200-0102

MAP READING

A NOTE TO TEACHERS

At the ministère de l'Éducation's request, the ministère de l'Énergie et des Ressources du Québec has produced a version of the topographic map of Beloeil (1/20 000 31H-200-0102) for use in the classroom. This map is available at a lower price than other maps of the same type at this address:

Service de la cartographie
Ministère de l'Énergie et des Ressources
1995 Boul. Charest
Ste-Foy (Québec)
G1N 4H9

Téléphone: 643-7704

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1. LOCATION OF THE BELOEIL REGION

Content

To study the location of the Beloeil region in relation to the pupil's region, to the Montreal region, and finally, to southern Québec.

Recommended Materials

- A map of southern Québec,
  or
- a Québec road map,
- * a map of the Montreal region.

Practical Activities

- Locate Beloeil with the aid of the index and the letter and number grid of the road map.
- Locate Beloeil in relation to your region, to Montreal, and to some other cities in the province, using the cardinal points.
- Calculate the distance between Beloeil and your town or municipality, between Beloeil and Montreal, and between Beloeil and other cities in the province, using the road map's scale.
- Identify the highways and main roads that lead to Beloeil.
- Identify the waterways that lead to Beloeil.
- Identify the cities, towns, or municipalities within a 20 km radius of Beloeil.
- Using a road map, trace the area mapped on the topographic map of Beloeil.

2. GENERAL INFORMATION ON THE TOPOGRAPHIC MAP OF BELOEIL:

- Title,
- Number,
- Assembly Table,
- Copyright Notice.

Content

TITLE: BELOEIL

The topographic map of *Beloeil* is identified by the name of the town of Beloeil.

NUMBER: 31H 11-200-0102

* Topographic maps of Québec are numbered according to the national cartographic reference system. Map numbers have three parts:

A	B	C
31H 11	200	0102

A: The number of the map on the 1:20 000 scale in the national system.

B: The number representing the map's scale.

C: The number of the provincial map section.

* **ASSEMBLY TABLE**

The number of the map of Beloeil appears at the center of the assembly table on which the numbers of the maps of neighboring regions are recorded.

ASSEMBLY TABLE

31H 11-200-0201	31H 11-200-0202	31H 10-200-0201
31H 11-200-0101	31H 11-200-0102	31H 10-200-0101
31H 06-200-0201	31H 06-200-0202	31H 07-200-0201

* Content related to an optional objective

COPYRIGHT NOTICE

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Ministère de l'Énergie et des Ressources
© Québec 1981, tous droits réservés
Dépôt légal — 3e trimestre 1981
Bibliothèque nationale du Québec

The map was produced by the ministère de l'Énergie et des Ressources du Québec and is protected by copyright.

Practical Exercises

- Identify the title and the number of this topographic map. What does this title correspond to?
- What do the different parts of the map's number correspond to?[1]
- What is the purpose of the assembly table? In what year was the map produced?[1]
- Find out what "copyright" means?
- Under what conditions can the topographic map be reproduced or used as a basis for making other maps?

3. TECHNICAL INFORMATION ON THE TOPOGRAPHIC MAP OF BELOEIL

Content

The technical data on the map provide general information about the making of the map.

PROJECTION MERCATOR TRANSVERSE MODIFIÉE (M.T.M.)

FUSEAU: 8

ÉQUIDISTANCE DES COURBES: 5 et 10 MÈTRES
Ces courbes sont cotées par rapport au niveau moyen de la mer

Déclinaison magnétique au centre de la feuille en 1981:
16°12' ouest
Variation annuelle: 0.7' vers l'ouest

Surface de référence: Ellipsoïde de Clarke, 1866
Réseau géodésique: Points intégrés, 1977
Photographie aérienne: 1:40 000, 1977
Toponymie: Commission de toponymie
Projet: P89-79

MODIFIED TRANSVERSE MERCATOR PROJECTION[1] (M.T.M.P.)

ZONE 8

CONTOUR INTERVAL: 5 AND 10 METRES
These contours are numbered in relation to mean sea-level.

Magnetic declination at the center of the sheet in 1981:
16°12' West
Annual Variation: 0.7' to the west

Surface of reference: Clarke's ellipsoid, 1866
Geodetic network: Integrated points, 1977
Aerial photograph: 1:40 000, 1977
Toponymy: Commission de Toponymie
Project: P89-79

The Beloeil map is based on a 1977 *aerial photograph* on a 1:40 000 scale.

1 The *projection system* used is known as the Modified Transverse Mercator Projection (M.T.M.P.). The area represented on the Beloeil map is located in Zone 8.

* The magnetic declination is the angular distance (either East or West) between true North or Geographic North and magnetic North, which is indicated by a compass. The magnetic North Pole is located near Bathurst Island in the Canadian Arctic, and its position does not coincide with that of the Geographical North Pole. Due to variations in the earth's magnetic field, the magnetic North moves constantly. If its average annual variation is known, the magnetic declination for a given year can be calculated.

– Magnetic declination for the map of Beloeil in 1981: 16°12' West.

– Annual variation: 0,7' to the West.

– Magnetic declination for Beloeil in 1982: 15°21, 2' West.

In secondary school it is not necessary to focus on the surface of reference and the geodetic network.

Practical Exercises

– Identify the date of the aerial photograph from which the topographic map was made.

* Identify the type of projection used.

– Differentiate between the following terms:
  – magnetic North;
  – geographic North;
  – astronomical North;
  – true North.

* Identify the magnetic declination for this map for the year 1981.

* Calculate the magnetic declination for this map for the year 1982.

* Activity related to an optional objective

4. ORIENTATION OF THE TOPOGRAPHIC MAP OF BELOEIL

Content

There is no compass card and no arrow to indicate north on the map. The geographic north is found at the intersection of the left and right edges of the map (east and west), that is, along the extension of the meridians.

Practical Exercises

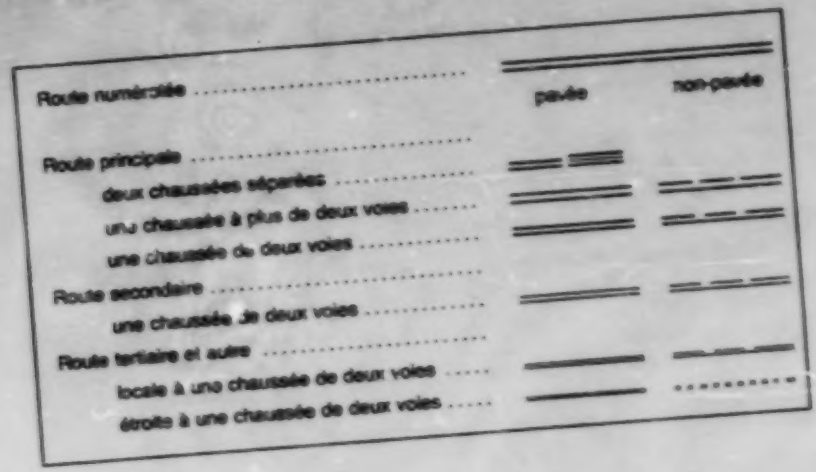
- Identify the map's north and the other cardinal points.
- Set the map of Beloeil with the aid of a compass.
- Identify the stream in the northern part of the map.
- Identify the village located southeast on the map.
- Where is the town of Beloeil located in relation to the map?
- Where is the village of St-Jean Baptiste in relation to Mont Saint-Hilaire?

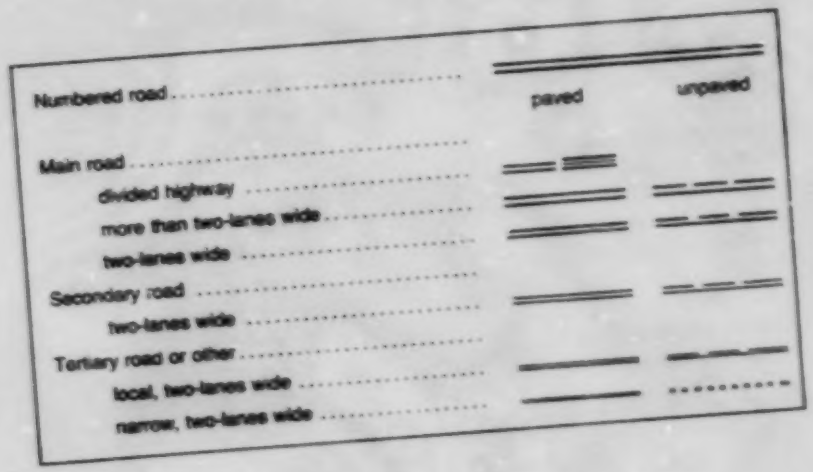
5. LEGEND OF THE TOPOGRAPHIC MAP OF BELOEIL

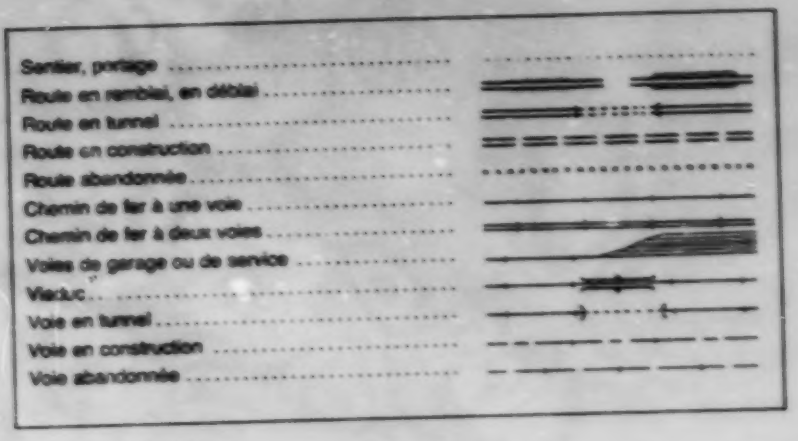
Content

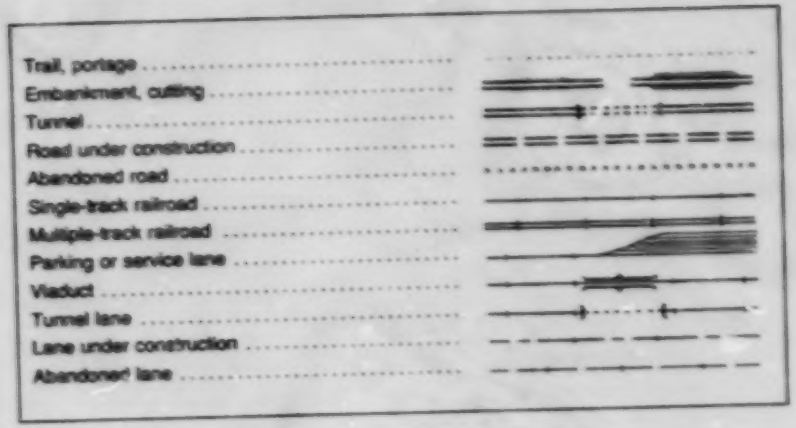
The legend makes it possible to read and interpret the information on the map. It consists of a number of tables which contain the symbols and conventional signs used to represent the physical and man-made features of the Beloeil region. This information falls into four categories:

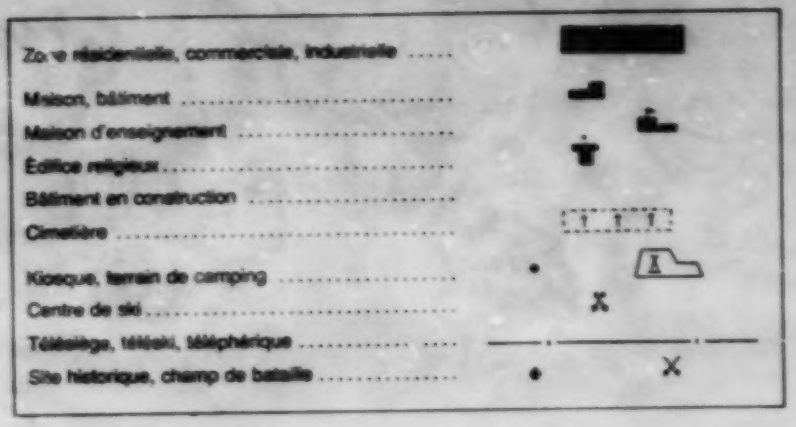
- communication routes;
- construction;
- hydrography;
- vegetation.

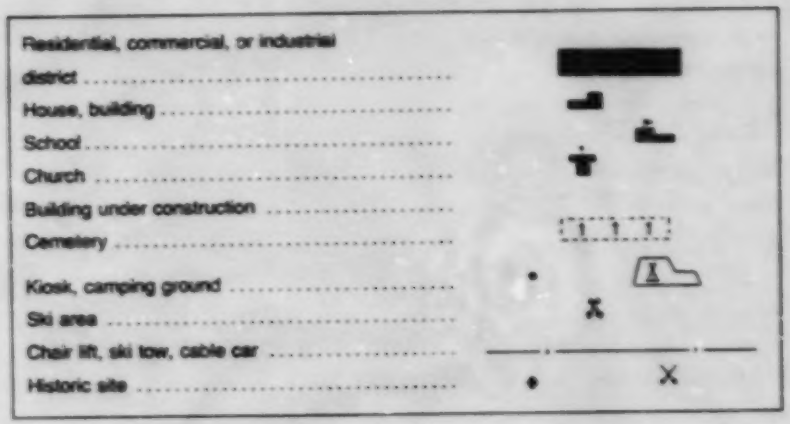

Route numérotée
pavée
non-pavée
Route principale
deux chaussées séparées
une chaussée à plus de deux voies
une chaussée de deux voies
Route secondaire
une chaussée de deux voies
Route tertiaire et autre
locale à une chaussée de deux voies
étroite à une chaussée de deux voies

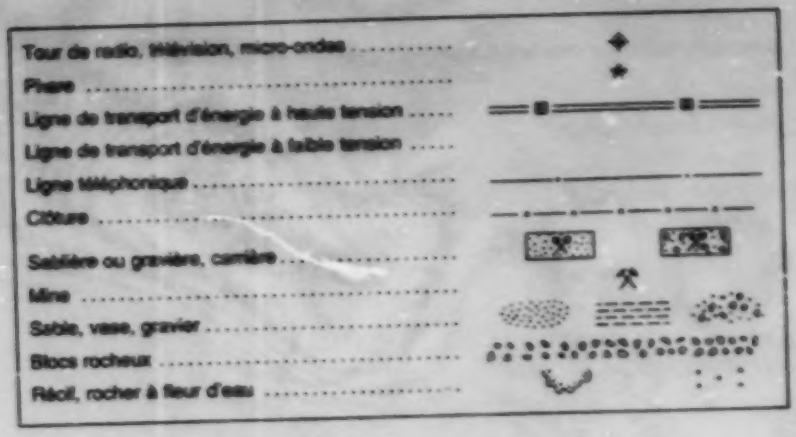

Numbered road
paved
unpaved
Main road
divided highway
more than two-lanes wide
two-lanes wide
Secondary road
two-lanes wide
Tertiary road or other
local, two-lanes wide
narrow, two-lanes wide

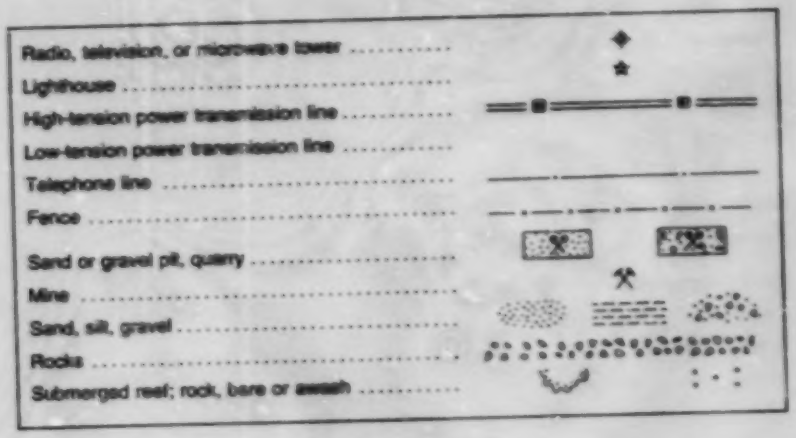

Sentier, portage
Route en remblai, en déblai
Route en tunnel
Route en construction
Route abandonnée
Chemin de fer à une voie
Chemin de fer à deux voies
Voies de garage ou de service
Viaduc
Voie en tunnel
Voie en construction
Voie abandonnée


Trail, portage
Embankment, cutting
Tunnel
Road under construction
Abandoned road
Single-track railroad
Multiple-track railroad
Parking or service lane
Viaduct
Tunnel lane
Lane under construction
Abandoned lane


Zone résidentielle, commerciale, industrielle
Maison, bâtiment
Maison d'enseignement
Édifice religieux
Bâtiment en construction
Cimetière
Kiosque, terrain de camping
Centre de ski
Télésiège, téléski, téléphérique
Site historique, champ de bataille


Residential, commercial, or industrial district
House, building
School
Church
Building under construction
Cemetery
Kiosk, camping ground
Ski area
Chair lift, ski tow, cable car
Historic site


Tour de radio, télévision, micro-ondes
Phare
Ligne de transport d'énergie à haute tension
Ligne de transport d'énergie à faible tension
Ligne téléphonique
Clôture
Sablière ou gravière, carrière
Mine
Sable, vase, gravier
Blocs rocheux
Récif, rocher à fleur d'eau


Radio, television, or microwave tower
Lighthouse
High-tension power transmission line
Low-tension power transmission line
Telephone line
Fence
Sand or gravel pit, quarry
Mine
Sand, silt, gravel
Rocks
Submerged reef; rock, bare or awash

Practical Exercises

Using the map legend, reproduce the symbols representing the following:

- a highway;
- a road under construction;
- a bridge;
- a high-tension power transmission line;
- a ski area;
- a cemetery;
- a school;
- the boundary of a wooded area;
- an orchard;
- etc.

Using the symbols on the topographic map of Beloeil, identify the following:

- the two main rivers flowing through the region;
- some cities in the region;
- the two main access roads to the region;
- the railway that serves the region;
- some bridges over the Richelieu River;
- some signs of the importance of agricultural activities in the region.

* Identify the number of silos and greenhouses from Ste-Madeleine (at the point of junction with the Canadian National tracks), along the St-Simon Rang, to the east end of the map.

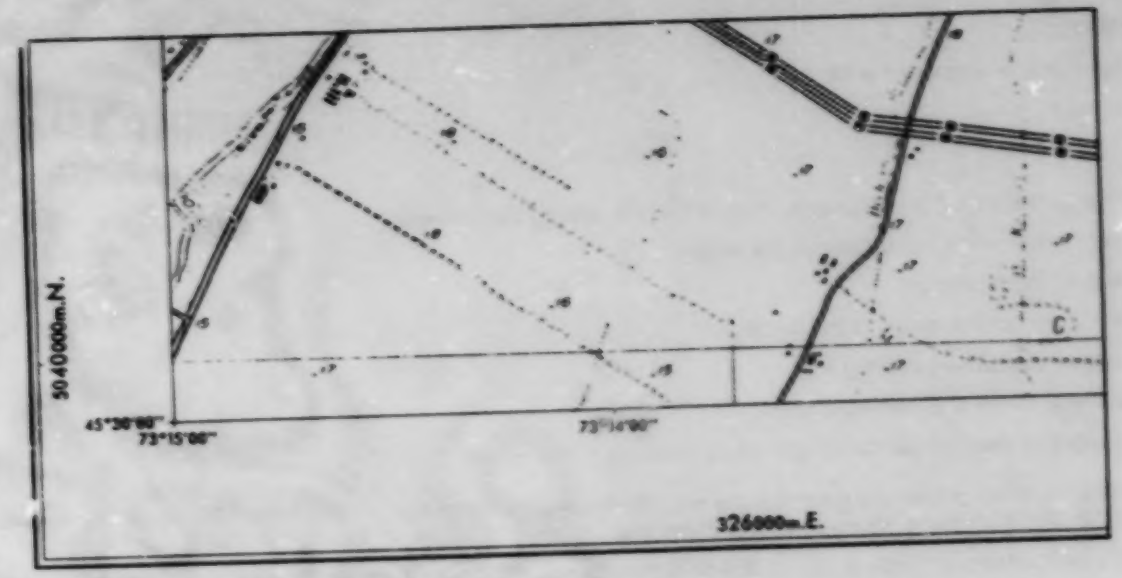
Identify the number of farms located in the St-Simon Rang from the east end of the map to the first crossroads.

* Activity related to an optional objective

6. GEOGRAPHIC COORDINATES ON THE TOPOGRAPHIC MAP OF BELOEIL

Content

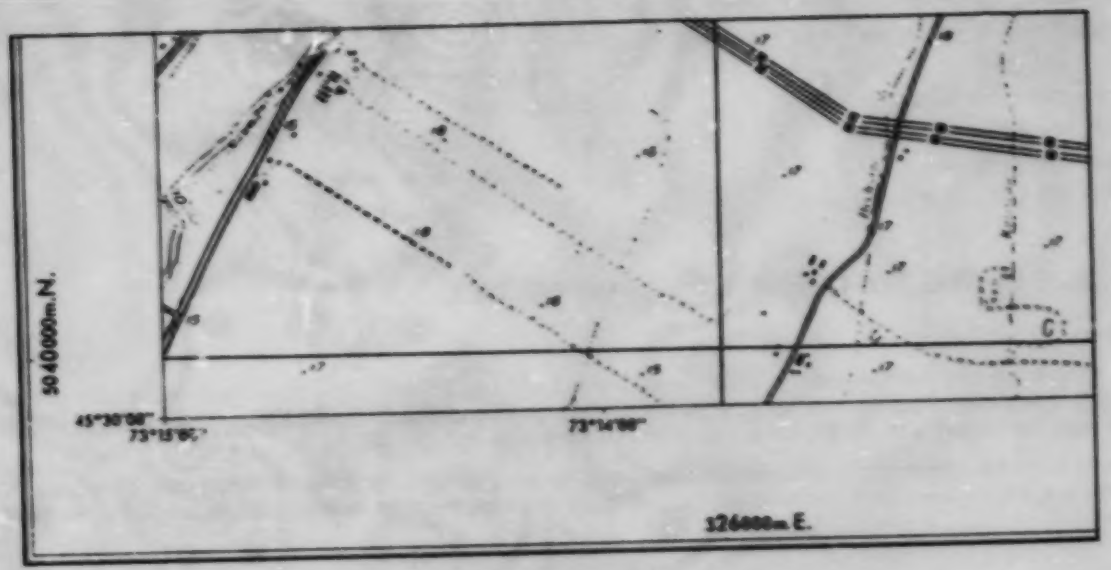
Topographic maps of Québec are divided into sections bounded by the meridians and parallels. The lines marking the east and west ends of the map correspond to the earth's meridians, whereas the lines marking the north and south ends correspond to the parallels. These lines are subdivided into degrees, minutes, and seconds of longitude and latitude. They constitute a system of geographical coordinates which makes it possible to locate places accurately.



Practical Exercises

- Identify the boundaries of the region represented on the map of Beloeil, using the geographic coordinates.
- Identify the longitude of different towns or municipalities.
- Identify the latitude of different towns or municipalities.
- Identify the geographic coordinates of the town of Beloeil.

7. TOPOGRAPHIC COORDINATES OR THE SYSTEM OF PLANE COORDINATES OF QUÉBEC (M.T.M.P. OR MILITARY GRID)



Content

The grid drawn over the map represents the system of plane coordinates expressed in metres (m). The X coordinate increases from left to right (from west to east), whereas the Y coordinate increases from bottom to top (from south to north). Each square of the grid measures 10 cm × 10 cm.

Practical Exercises

– Give the horizontal boundaries of the map using the topographical coordinates.

– Give the vertical boundaries of the map, using the topographical coordinates of:

- the Beloeil train station;
- the St-Hilaire train station;
- the sugar refinery in St-Hilaire;
- the intersection of Route 20 and Grand Rang.

– Identify the symbols located at the following coordinates:

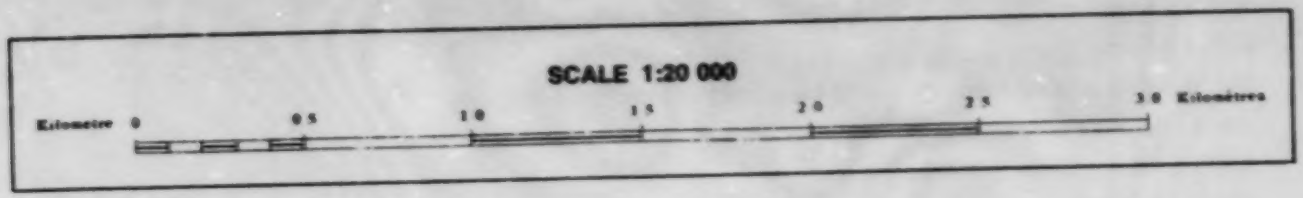
- 271 480 (arena)
- 271 470 (commercial district)
- 271 461 (church)
- 330 470 (quarry)
- 329 506 (drive-in movie theater)
- 390 530 (highway)
- 339 419 (factory)
- 400 519 (railway)
- 345 475 (mobile home park)
- 275 450 (railway bridge)

8. SCALE OF THE TOPOGRAPHIC MAP OF BELOEIL

Content

The graphic scale and the numerical (fraction) scale are indicated on the map. The map's scale is the ratio of a length on the map to the corresponding length on the ground. The scale of the map of Beloeil is 1:20 000. This means that 1 centimetre (cm) on the map corresponds to 20 000 centimetres or 200 metres on the ground.

The scale 1:20 000 is considered an average scale. Certain generalizations had to be made in mapping the area. Some details were left out, others were enlarged or reduced, and in some cases symbols instead of lines are used to represent certain features.



Practical Exercises

- Calculate the area of the territory represented on the topographical map of Beloeil.
- Determine the length of the Richelieu River.
- Calculate the distance between the village of Ste-Madeleine and the Beloeil golf course via Route 116.
- Calculate the distance between the villages of Ste-Madeleine and St-Jean-Baptiste via the South Rang of the river and the St-Jean Baptiste road.
- Give the length and width of the river and the St-Jean Baptiste road.
- Calculate the distance from the La Montagne road at 290 446 to the entrance of the Domaine Rouville at 325 423.
- * Calculate the area of Lake Hertel at 320 478, using the square method.
- * Determine the width of the Richelieu River at the bridge on Highway 20.

9. REPRESENTATION OF RELIEF ON THE TOPOGRAPHIC MAP OF BELOEIL

Content

On a topographic map relief is represented by means of contour lines. Spot heights indicate the exact elevation of a particular spot on the ground above mean sea-level.

Contour lines are lines that join all spots of equal altitude above mean sea-level. The vertical distance between adjacent contours is known as contour interval. The contour intervals on the map of Beloeil measure 5 and 10 metres.

Contour intervals: 5 and 10 metres
These contour intervals are numbered according to altitude above mean sea-level.

* Activity related to an optional objective

Practical Exercises

Absolute Altitude

- Give the altitude of the Pain de Sucre peak located at coordinates 305 455.
- Give the average altitude of Highway 20.
- Give the altitude of the Belceil golf course.
- Give the altitude of the Huron River (520 350).
- Give the average altitude of the spot heights of the valley between the coordinates 520 350 and 440 340.
- Find the lowest and highest altitudes on the map.

Relative Altitude

- Calculate the elevation between Lake Hertel (332 450) and the Pain de Sucre peak (305 455).
- Calculate the relative altitude of Mont Saint-Hilaire (peak 305 455).
- Calculate the relative altitude between the shores of Lake Hertel (320 450) and the peak of Mont Saint-Hilaire (305 455).

Contour Lines

- Identify the contour line along the Huron River (420 338) and along the concession road (440 330).
- Identify a main contour line and an intermediate contour line on the map.
- Give two characteristics of a main contour line.

Contour interval

- Identify the contour interval used on the topographic map.
- Identify the spots where a contour interval of 10 metres is used.
- Use the contour interval to calculate the width of the Huron River valley (520 350).
- Use the contour interval to calculate the gradient of the La Montagne road from the intersection of the Trente road and the La Montagne road (444 and 291) to the crossroads at 438 312.

10. TOPOGRAPHIC CROSS-SECTION AND GROUND PROFILE

Content

A topographic cross-section is a technique that makes it possible to visualize the shape of the relief represented by the contour lines at different spots on a topographic map.

Practical Exercises

- Draw a topographic cross-section of Mont Saint-Hilaire between the coordinates 320 428 and 320 480. Use a 5-times vertical exaggeration.
- Indicate on the resulting profile:
  - the orientation of the relief;
  - Lake Hertel;
  - the orchard area;
  - the steep sides and the gentle sides of the mountain;
- Draw a topographic cross-section of Mont Saint-Hilaire between the coordinates 295 475 (Saint-Hilaire East train station) and 310 461 (420 km peak). Use a 5-times vertical exaggeration.
- Indicate on the resulting profile:
  - the orientation of the relief;
  - the shape of the slope;
  - the section of the slope where the contour lines are crowded together;
  - the section of the slope where the contour lines are widely spaced.

11. GROUND SLOPES

Content

On a topographic map, closely spaced contour lines indicate a steep slope, whereas widely spaced contour lines indicate a gentle slope. If the space between the contour lines is even, the slope is regular. If the contours are widely spaced at the bottom and more closely spaced toward the top, the slope is *concave*. If the contours are closely spaced at the bottom and more widely spaced toward the top, the slope is *convex*.

Practical Exercises

- Identify on the map of Beloeil the places where the contour lines are closely spaced and the places where they are widely spaced. Identify the types of slopes represented by these contours.
- Draw some topographic cross-sections to identify the type of relief to which these contour lines correspond.
- Identify on the map of Beloeil a number of contour lines with a constant interval. Identify the type of slope to which these contours correspond.
- Identify the steeper side of Mont Saint-Hilaire and the steeper side of the Pain-de-Sucre.
- * Identify on the map of Beloeil a concave and convex slope.

12. LANDFORMS

- Hills
- Valleys
- Plains
- Plateaus
- Mountains
- N.B. The other types of landforms are not studied in Secondary I.

Content

By studying the contour lines on a topographic map it is possible to discover the relief of the region represented on the map. The table on the following page sums up the main observations it is possible for the pupil to make.

The Beloeil region is located in the Richelieu *Valley*, which is part of the Montreal *lowland*. This region is dominated by Mont Saint-Hilaire, a Monteregian *hill* composed of igneous rocks resistant to erosion. The favorable relief and climatic conditions of the region explain the flourishing agriculture of the area. Among other crops, the region produces apples and sugar beets. The close proximity of the city of Montreal also made possible the development of several dormitory towns.

* Activity related to an optional objective

Types of Relief	On the Ground	On the Topographic Map
Hill	– rounded shape – often isolated – low altitude – possibilities of development and settlement	Contour lines: – circular – relatively closely spaced – relatively low spot heights – symbols representing human settlement
Mountain	– various shapes – often arranged in range formation – high altitudes – steep gradients – difficult to develop and settle	Contour lines: – numerous – irregular arrangement – very closely spaced – high spot heights
Valley	– U-shaped or V-shaped – elongated depression – often crossed by a stream or river – altitudes decreasing toward the bottom – easily developed and settled	Contour lines: – arranged in V or U form – low spot heights at the bottom and higher spot heights toward the top of the sides – symbols indicating human settlement
Plain (Lowland)	– flat or slightly undulating surface – generally large surface area – low altitude – easily developed and settled	Contour lines: – generally linear or undulating – generally low spot heights – symbols showing human settlement
Plateau	– plane, eroded surface – generally large surface area – higher altitude than a plain – gradient – possibilities of development and settlement	Contour lines: – very widely spaced on the surface – very closely spaced at the edges – symbols indicating human settlement

Practical Exercises

- Based on the preceding table, identify the types of relief represented on the topographic map of Beloeil.
- Identify the features of the map which make it possible to distinguish a hill from a plain.
- Identify one or more valleys represented on the topographic map. Identify the stream(s) or river(s).
- Locate the Huron River in relation to the Richelieu River. Identify the type of relief through which these rivers flow and their direction.
- Identify the drainage canals located between the Saint-Simon Rang and the Argenteuil Rang (400 480), and indicate the type of landform in which they are located.

13. RELATIONSHIPS BETWEEN LANDFORMS AND VARIOUS ASPECTS OF PHYSICAL AND HUMAN GEOGRAPHY

Content

During map reading activities the pupil should be encouraged to establish *simple* relationships between various features of the physical and human environments, which is the subject of geography.

For example, relief generally influences the development of the hydrographic system and a major part of human activities.

When reading a map, a great number of relationships can be established between *landforms* and

- vegetation,
- hydrographic systems,
- urban landscapes,
- rural landscapes,
- recreation,
- etc.

Practical Exercises

- Lac Hertel is located on Mont Saint-Hilaire. Consider how the relief around the lake has made this geographical phenomenon possible.
- Identify the landform which made possible the development of:
  - the urban area in the Beloeil and Mont Saint-Hilaire region;
  - communications;
  - agricultural lands.
- Is the relief favorable to the expansion of the town of Beloeil (or the town of Mont Saint-Hilaire) to the west, east, north, and south? Why.
- Select the landform that is most favorable to the establishment of
  - an outdoors recreation park,
  - a ski trail (identify the slope, too),
  - a bicycle trail,
  - etc.
- Is Mont Saint-Hilaire, which is a hill, wooded or cleared?

14. CONCLUSION TO THE READING OF THE TOPOGRAPHIC MAP OF BELOEIL

Whether it is done orally or in writing, the pupil's conclusions after reading the map should be brief and very simple, the length of a paragraph.

The study of the map of Beloeil should have enabled him to observe certain characteristic features of the physical and human geography of the region. He should show the relationship between the two in his conclusion.

The final commentary should stress the following points:

- the location of the Beloeil region;
- the physical geography of the region (relief, hydrography, vegetation, etc.) and its relationship with human settlements (agricultural and urban areas).

Example

The region represented on the topographic map of Beloeil is located about 30 km from Montreal on the south shore of the St-Lawrence River.

It is mainly a *lowland region*, with the Richelieu River flowing in the west, and the *hill* of Mont Saint-Hilaire standing in the southwest. This generally flat relief is favorable to agriculture and urban settlement, especially along the Richelieu River west of Mont Saint-Hilaire, and equally favorable to the development of a communication network.

15. SYNTHESIZING ACTIVITY: RALLY USING THE TOPOGRAPHIC MAP OF BELOEIL

From the village located in the southeast section of the map, take the road west.

1. What is the name of this village?

2. What is the name of the road you're taking?

At the end of the road turn south until you reach the next fork in the road.

3. At this junction should you turn left or right?

Continue on this road. Turn left at the first road you find.

4. What is the name of the rang you're following now?

5. What is the name of the canal that crosses the "rang"?

Continue on this road until the next crossroads. Turn northeast.

6. What is the village at the end of this road?

7. Give the topographical coordinates of the church of this village.

Leave this village by the northeast road. Continue on this road to the next village.

8. What is the name of this "rang"?

9. Name the streams that cross the "rang" between the two villages.

10. What is the other name of this "rang"?

Leave this third village by the road leading north.

11. Coming out of the village you cross a railway track. What company does it belong to?

12. While on this road you will be crossing a highway. Which highway is it?

Take this highway west.

13. Calculate the distance covered (in kilometres) from the viaduct on Plamondon Road to the second river you find.

14. What is the name of this river?

15. How wide is the river at the level of the highway?

Cross the river and take the exit to the road along the west shore of the river.

16. What is the number of this road?

Go south for a distance of 3.7 km.

17. What is the meaning of the symbol at this spot on the river?

18. In your opinion, in what direction does the river flow?

From this spot, go to the nearest commercial center.

19. On which important road is this commercial center located. (Give the number).

20. To the west of this center there is a wooded area. What is its function?

Taking this main road in front of the commercial center, go east. Go across the river again. At the level of the topographic coordinates (473 295), stop.

21. What building can you observe northwest of your position?

22. What landform can you identify southeast of your position?

23. Give the name of this landform.

24. What is the highest spot on this landform? Give its topographical coordinates.

25. What is the name of the lake located on this landform?

Leave this spot and go to these coordinates: (469 326)

26. What is the shortest route you can take to get to these coordinates?

27. What is the meaning of the symbol represented by these coordinates?

Return to the road and go to the junction of the Benoît road and the Northwest Rang.

28. Calculate the distance (in kilometres) covered since your last stop (469 329).

Stay on the Benoît road until you reach the junction of the North Rang of the river. Turn on this rang, continue for about 4 km, and go to Domaine Rouville to the west of the rang.

29. How many silos did you find along this "rang"?

30. What agricultural activity can you identify on the side of Mount Saint-Hilaire near Domaine Rouville?

ANSWERS TO THE QUESTIONS OF THE RALLY

1. Saint-Damase
2. Rang Saint-Louis
3. Right
4. Rang des Trente
5. La Grande Décharge
6. Saint-Jean-Baptiste
7. (420 341)
8. Rang south of the river
9. Normandin, Blanchard, Principal, Saint-Simon
10. Saint-Jean Baptiste Road
11. Canadian National
12. Highway 20
13. 7 km
14. Richelieu River
15. About 0,2 km
16. (223)
17. Marina
18. North
19. (116)
20. Golf Course
21. St-Hilaire Esst Train Station
22. A hill
23. Mont Saint-Hilaire
24. 410 m (461 309)
25. Lac Hertel
26. Road 116 — Benoit Road
27. Quarry
28. About 5,05 km
29. 6 silos
30. Orchard and apple growing

7. Appendix 2

THE DEVELOPMENT OF THE GENERAL GEOGRAPHY COURSE AND CURRICULUM GUIDE

APPENDIX 2
The Development of the General Geography Course and Curriculum Guide

Introduction

The General Geography course was developed through the cooperative effort of nearly a thousand people consulted throughout its preparation. It was developed in several steps and made extensive use of the available resources in the field.

The following pages give an overview of the process used and the steps involved in its preparation. They also offer a brief justification for the new course and the companion curriculum guide.

1. SUMMARY OF KEY ISSUES

1.1 Current Situation

It is generally agreed that the teaching of social studies fulfills the objectives of general education. However, in the current context, the implementation of an introductory geography course poses certain problems. On the one hand, many school boards still do not offer their pupils a course in general geography. On the other hand, while other school boards do offer Geography 110, the general nature of the outline course leads to a range of different interpretations by teachers in the classroom.

1.2 Situation Desired

For these reasons, after extensive consultation, **The Schools of Québec: Policy Statement and Plan of Action** established the new course in **General Geography** as a compulsory part of the formal social studies program. All elementary school pupils benefit from an introduction to social studies program. In secondary school, all pupils will take courses in general geography and history followed by the geography and history of Québec and Canada, and in the final year of secondary school they will take a course in economics. Even though no one of these courses is prerequisite to any other, an effort has been made to coordinate their content.

The content of the new course has been specified in terms of learning objectives for the pupil. These derive directly from the aims and objectives of education in **The Schools of Québec**.

Teaching by objectives should lead to more coherence and effectiveness in areas as diverse as evaluation, preparation of instructional materials, teacher training, educational research and innovation, etc.

A curriculum guide has been prepared for use with the course and will provide the teacher with a range of suggestions intended to facilitate the teaching/learning process.

2. DEVELOPMENT OF THE COURSE AND CURRICULUM GUIDE

2.1 Choosing a Development Model

The preparation of such important teaching materials as a course and curriculum guide cannot be a random process. For this reason, and in keeping with the ministère de l'Éducation's framework for course, program, and curriculum guide development, the secondary school social studies coordinator and her team adopted a development "model" that involves several stages and makes use of the resources in the field. The main characteristic of this "model" is that it requires a preliminary analysis of needs through extensive consultation, and relies on committees for the development of courses, programs, and guides.

2.2 The Development of the Course by Committees

Apart from the formation of a permanent team for social studies, made up of the coordinator of courses and programs

and of teachers on a contract basis, a vital stage in the development process was the formation of committees.

The production committee, made up of five or six teachers and specialists, had the mandate of completing the first draft of the work submitted by the permanent team from the social studies sector.

The advisory committee was made up of a dozen or so people (teachers, specialists, representatives of associations and organizations, etc.) whose mandate was to revise and approve the work given to them.

The documents were then sent into the schools for consultation before being submitted a second time to the committees for revision.

2.3 Analysis of Needs and Consultation

In an effort to better meet the expectations of Québec society, needs were analyzed throughout the development of the course and the guide. This analysis was carried out in an ongoing process of gathering information and consulting teachers, school board representatives, associations, and organizations, sometimes during conferences and professional development days.

This analysis of needs was also performed on a more formal basis by sending all full-time geography teachers a needs assessment questionnaire. The results obtained through data-processing the statistical date (mean, standard deviation, correlation) facilitated the selection of the related content for the new course.

The General Geography course and curriculum guide, as well as other new courses in social studies, were developed through this process of needs analysis, consultation, formative evaluation, and decision-making in committees

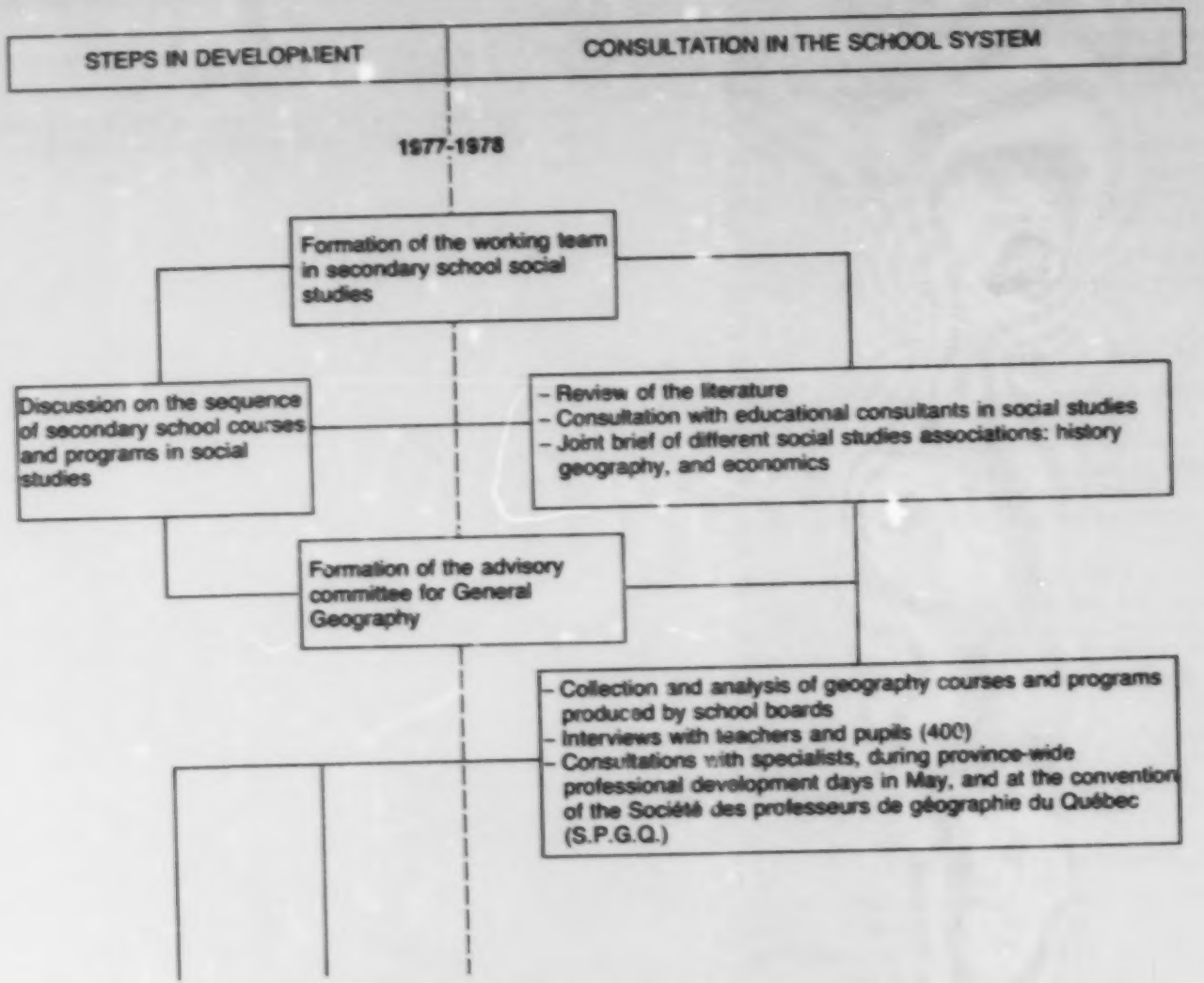
2.4 Official Approval and Implementation

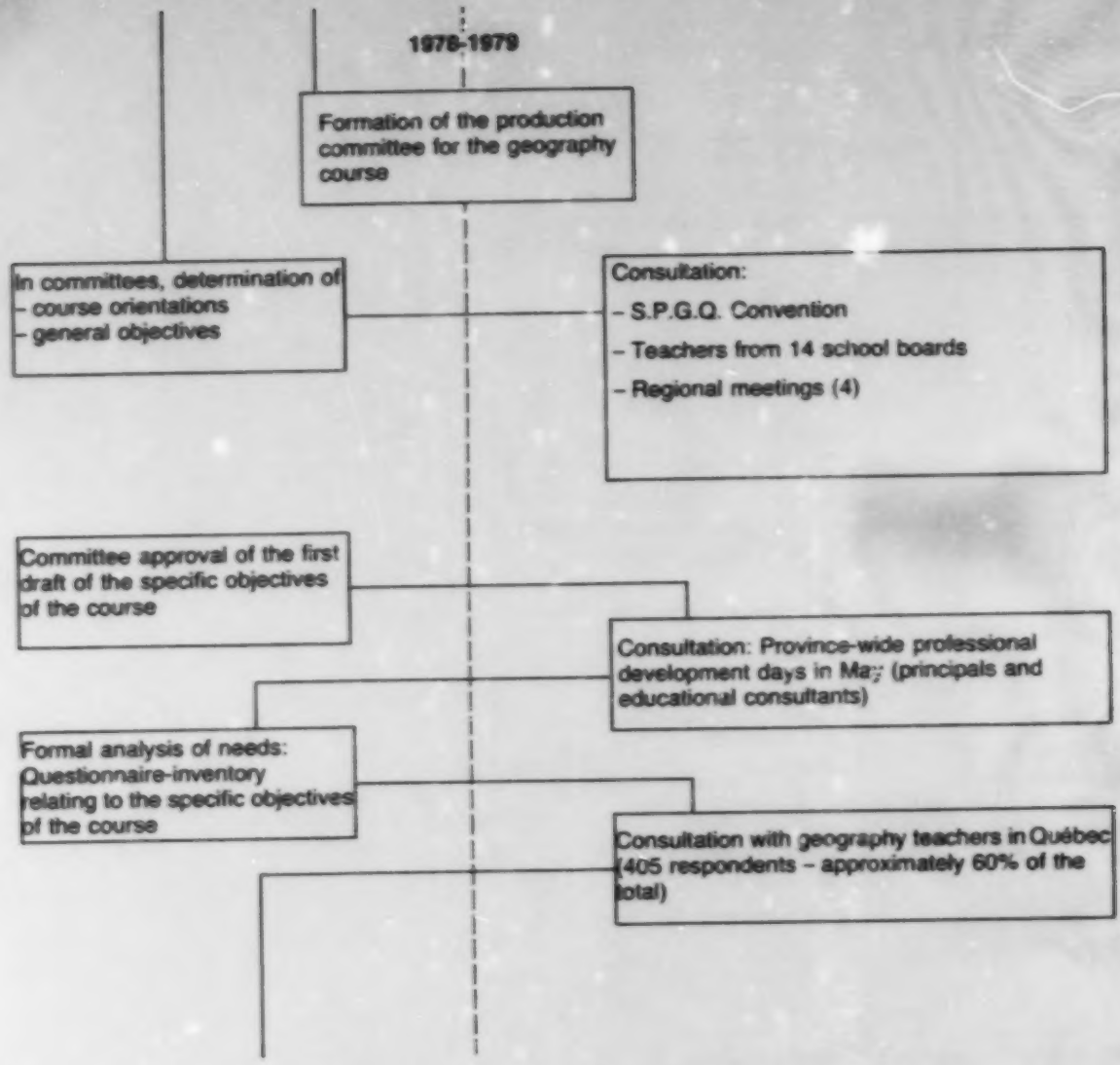
The final version of the course and curriculum guide was then submitted for approval to the Conseil des cadres de la Direction du développement pédagogique, to the offices of the Deputy-Minister and Minister of Education, and to the Catholic and Protestant Committees of the Conseil supérieur de l'Éducation.

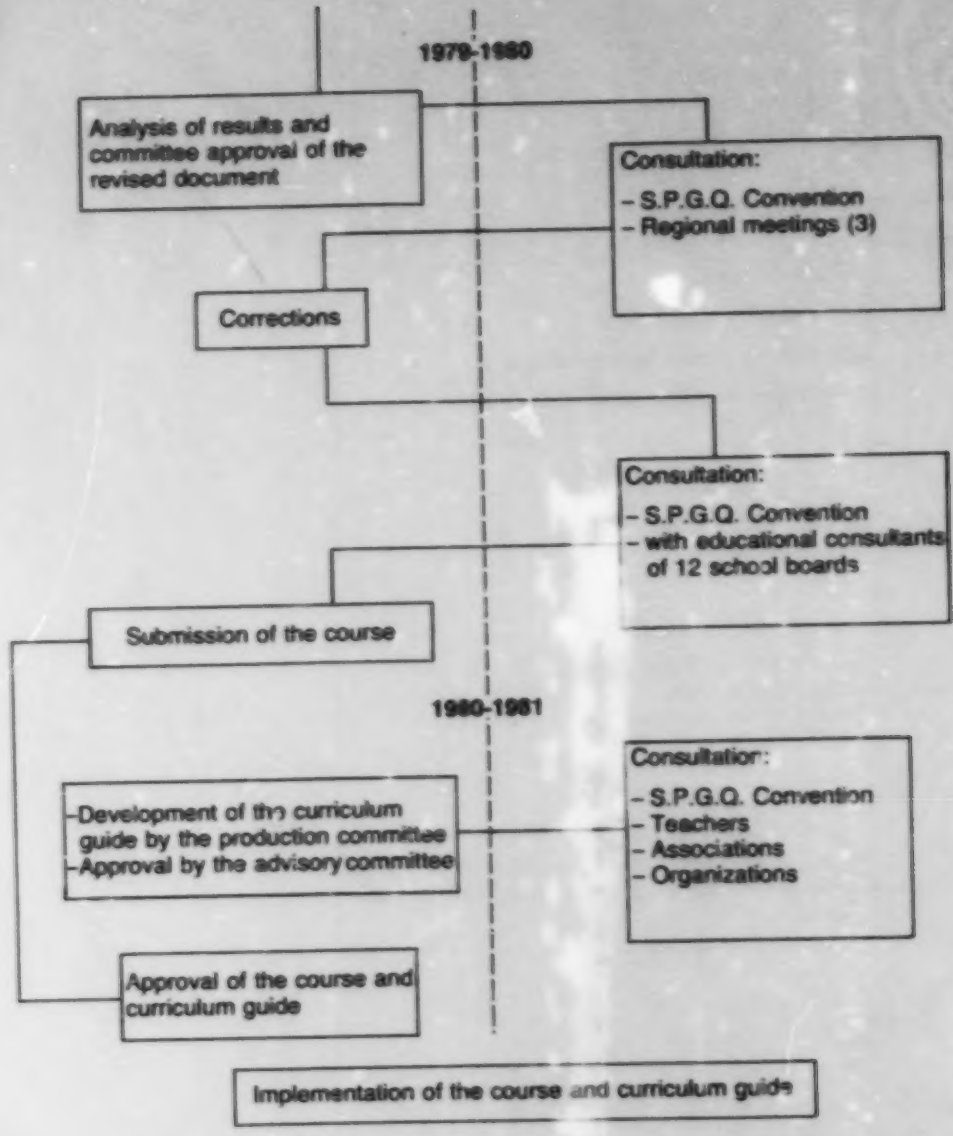
Once it had been approved at this level, the General Geography course could be introduced in the schools.

The following diagram illustrates the different preparation and consultation stages which preceded the implementation of the course.

DIAGRAM OF THE STEPS IN THE DEVELOPMENT OF THE GENERAL GEOGRAPHY COURSE CURRICULUM GUIDE




1978-1979
Formation of the production committee for the geography course
In committees, determination of
- course orientations
- general objectives
Consultation:
- S.P.G.Q. Convention
- Teachers from 14 school boards
- Regional meetings (4)
Committee approval of the first draft of the specific objectives of the course
Consultation: Province-wide professional development days in May (principals and educational consultants)
Formal analysis of needs: Questionnaire-inventory relating to the specific objectives of the course
Consultation with geography teachers in Québec (405 respondents – approximately 60% of the total)


1979-1980
Analysis of results and committee approval of the revised document
Consultation:
- S.P.G.Q. Convention
- Regional meetings (3)
Corrections
Consultation:
- S.P.G.Q. Convention
- with educational consultants of 12 school boards
Submission of the course
1980-1981
Consultation:
- S.P.G.Q. Convention
- Teachers
- Associations
- Organizations
-Development of the curriculum guide by the production committee
-Approval by the advisory committee
Approval of the course and curriculum guide
Implementation of the course and curriculum guide

3. LIST OF MEMBERS OF THE PRODUCTION COMMITTEE FOR THE GENERAL GEOGRAPHY COURSE AND CURRICULUM GUIDE

The course entitled **General Geography** (code 16-3657A) and the companion curriculum guide were developed by a team of people who drew upon the many resources of Quebec society. It is only possible to list here the names of those persons who contributed directly to the production of these documents. Sincere thanks are extended to each and every one of them.

1. ADMINISTRATION

LAPOINTE-AUBIN, Monique	Coordinator of Secondary School Social Studies, M.E.Q.	(1977-1982)

2. COORDINATION

PELLETIER, Denise	Educational Development Officer, M.E.Q. (Commission des Écoles catholiques de Québec	(1978-1981)

3. COOPERATION

3.1 Advisory Committee for Geography: Course and Guide

ASSALY, Robert	Provincial Association of Geography Teachers	(1978-1979)
BEAUREGARD, Ludger	Université de Montréal	(1978-1981)
BROUSSEAU, Michel	Agent de développement pédagogique, M.E.Q., (C.S.R. Chauveau)	(1979-1980)
CARLEY, Michael	C.S. Baldwin-Cartier	(1980-1981)
COURVILLE, Serge	Ministère de l'Environnement	(1979-1980)
FRIGON, Huguette	C.S.R. Vieilles-Forges	(1976-1979)
GENEST, Jean	C.S.R. de Tilly	(1980-1981)
GERMAIN, Jeannot	C.S.R Rouyn-Noranda	(1979-1980)
GUAY, Réal	Educational Development Officer, M.E.Q.	(1978-1979)
LABRIE, Ghislain	Société des professeurs de géographie du Québec, (Pensionnat Saint-Nom-de-Marie)	(1979-1981)
LAPIERRE, Isabelle	Commission des Écoles catholiques de Montréal	(1979-1981)
NINCHERI, Roger	C.S. Sainte-Croix	(1979-1980)
ROBERT, Benoît	Université Laval	(1979-1980)
TREMBLAY, Noël	C.S.R. de Chicoutimi	(1979-1981)
CHARBONNEAU, Robert	C.S.R. Le Gardeur	(1978-1979)
LACHANCE, Donald	C.S.R. du Bas St-Laurent	(1978-1980)
PLOURDE, Ralph	Commission des Écoles catholique de Montréal	(1978-1979)
RENÉ, André	Société des professeurs de Géographie du Québec, (C.S. Amiante)	(1978-1979)

3.2 Production Committee

AUTHIER, Denise	C.S.R. de Chambly	(1979-1980)
BEAUDOIN, Dollard	Université Laval	(1979-1981)
BURPEE, Peter	Université McGill	(1978-1979;
DESROCHERS, Yvan	C.S.R. Lignery	(1978-1980)
DOUCET, Bertrand	Educational Development Officer, M.E.Q.	(1979-1981)
PERRON, Maurice	C.S.R. de Chambly	(1979-1980)
POULIN, Roger	C.S.R. de la Mauricie	(1978-1979)

3.3 Consultation with Specialists: Course

– Measurement and Evaluation

NADEAU, Marc-André	Université Laval
FORTIN, Toussaint	Université du Québec à Hull